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Remarks on the Common Hydrometer, with a description of a new method of graduating that instrument. By Daniel B. Smith. Read October 1825.

There have been several modifications of the Pese-liqueurs of Baumè, all of which are liable to the same objections. The arèomètre of Cartier is so nearly similar to that of Baumè, that it is difficult to imagine a reason for adopting it in preference to that, unless indeed the accidental circumstance of its more careful graduation has secured it the superiority. Cartier plunges his arèomètre into a liquid marking exactly 22 of Baumè, and marks 22 on his scale at this point. He then takes on the scale a space equal to 16 of Baumè, which he divides into 15 parts or degrees. Thus the degrees of Cartier are 1-15th greater than those of Baumè, and the twenty-second degree of their scales correspond with each other. To reduce Cartier's scale to Baumè's add 1-15th of the difference between the given degree and 22, when the number exceeds 22; and subtract it when less.

The hydrometer of the Amsterdam Pharmacopœia of 1792, commences the scale at distilled water, and makes 40 correspond with 45 of Baumè; so that 6° of this scale equal 7° of Baumè. Another modification of Baumè's hydrometer, proposed by Niemann in the Pharmacopœia Batava, consists merely in making the point to which the instrument sinks in water, zero, instead of 10°, while the length of a degree continues the same.

The centigrade alcoholmeter of Gay-Lussac is by far the most convenient that has yet been devised for ascertaining the strength of spirituous liquors. The degrees of the scale indicate the per centage of absolute alcohol contained in the mixture. These degrees of course are of unequal lengths, and the instrument must be used at the temperature for which it was graduated; we shall otherwise be obliged to calculate the true proportion from the ordinary tables, of the expansion of spirits by heat. The instrument of Gay-Lussac, elegant and useful as it is, is therefore of limited utility, and not superior in practical value to the one which is now proposed. It may be remarked in passing, that the length of the degrees in the centigrade hydrometer may readily be calculated by the formula given below, aided by the tables of Gilpin.

The most exact method of ascertaining the specific gravities of fluids is, undoubtedly, to weigh equal bulks of them carefully. This mode, however, is troublesome, and not always practicable. Advantage has therefore been taken of the law of hydrostatics, that a floating body will displace a quantity, which is inversely as the weight of the fluid in which it swims. The hydrometer is constructed upon this principle—being a bulb with a long stem, so loaded that the two extremes of the stem will mark the lightest and heaviest fluids in which the instrument is to be tried. When proper care is taken in its construction the results which it gives are perfectly correct, although not capable of being observed with as much exactness as those of a good balance. The hydrometer in common use (that of Baumè) is of two kinds, one for spirits and the other for saline and acid solutions. The former is graduated by making the point to which it sinks in distilled water, ten degrees of the scale, and that to which it sinks in a solution of

one part, by weight, of dry muriate of soda in nine parts of water, zero; the instrument being so loaded that zero is at the lower end of the stem. In the latter the instrument is loaded so as to sink to the top of the stem in distilled water, which point is made zero; while the point to which it sinks in a solution of fifteen parts, by weight, of dry muriate of soda in eighty-five parts of distilled water, is marked fifteen degrees. The instruments are graduated by marking off equal divisions of these degrees respectively upon the stems. It is an objection to this mode of graduation, that by taking as starting points so small a part of the scale, the error of observation, if any, is multiplied in the higher numbers. Another objection, which applies equally to all the hydrometers in common use is, that the scales are altogether arbitrary, and that they are not intelligible to the general student.

To avoid the inconveniences above mentioned, it is proposed to construct an instrument, of which one hundred degrees shall represent an increase or decrease of two-tenths of specific gravity, water being zero, and the scale equally divided. As the depth to which it will sink, or the quantity of fluid which it will displace is in the inverse ratio of the specific gravity of the fluid, it is easy to ascertain the precise value of each degree of the scale in terms of specific gravity. Taking the specific gravity of water as 1, and that indicated by one hundred degrees of the instrument at .8, let it be required to find the specific gravity (S) indicated by any other degree (n) of the scale. Put x = the bulk of water displaced by the instrument, y = the bulk of each degree of the stem, and $x + 100y$ = the bulk of liquid of the specific gravity of .8, which will be displaced. Then as $1. : .8 :: x + 100y : x :. x = 400y$; and as $1 : S :: x + ny : x = \frac{nSy}{1-S}$, whence $S = \frac{400}{400+n}$. In the hydrometer for liquids heavier than water, in which one hundred degrees represent a specific gravity of 1.2, this formula becomes $S = \frac{600}{600-n}$ and $x = 600y$. From these data the numbers in table No. II. are calculated.

It is obvious that the scale here described is applicable to all the purposes for which the hydrometer can be used; that it is easily convertible into terms of specific gravity, and that great advantages would result from the general use of this or one similar. Any part, high or low, of the scale, can be adapted to an instrument with perfect accuracy; and its range can be extended so as to include the lightest and heaviest liquids, and the value of tenths and hundredths of degrees ascertained and observed.

A disadvantage of this and the common hydrometer is, that if the degrees of the stem be sufficiently large for accurate observation, the range of the instrument becomes very limited, or the stem inconveniently long. In Nicholson's, which is a very correct but somewhat inconvenient hydrometer, this defect is obviated by surmounting the stem with a flat dish and sinking it with weights to a constant depth. In Aikin's and Sike's, weights are added to that part of the instrument which is immersed in the fluid, and the strength above or below a certain standard, represented by each weight, is measured on the scale. In this instrument a calculation is necessary of the value of each degree of the scale for every weight that is used, as both the weight and bulk of the hydrometer are altered thereby. There are none of them as simple in principle and as convenient in practice as the instrument now proposed, in which we can attain the same object (of shortening the stem and preserving its range) without altering the principle of the graduation.

Let the stem be of solid metal, drawn out to a perfectly uniform diameter, and the pear-shaped appendage to the bulb be loaded with an extra weight equal to eighty degrees of the stem. Let then the length of stem equal to twenty degrees be ascertained by experiment, and the stem cut off a little beyond that mark. This length can be measured off on an exactly similar rod of metal, and circular discs of the same density and weight, and pierced like the weights of Aikin's hydrometer, may be readily formed. If we take four of these, attach them to the summit of the stem and lighten the bulb till the instrument again sinks to the same mark in the same fluid, it will evidently give the same measurements as high as the

twentieth degree, as if the weights were drawn out to the diameter of the stem and graduated to one hundred degrees. Let then one of the weights be taken from the top and attached below the ball of the instrument, and it will measure from twenty to forty degrees; if two are shifted it will measure from forty to sixty; from sixty to eighty, if three are shifted; and from eighty to one hundred, when all are immersed in the liquid.

The advantages of this arrangement are obvious; its principles are applicable to any number of degrees as well as to one hundred, and whatever part of the scale be taken for the range of the instrument.

The use of the hydrometer is much limited by the unequal expansion of different fluids by heat. It must always be used at the same temperature, unless the law by which the fluid expands be known. The various mixtures of alcohol and water, are the only liquids which have been subjected to experiments sufficiently multiplied to enable us to apply the requisite correction for heat.

The table No. I. is calculated from the very copious tables prepared by direction of the British Excise, and published in the Philosophical Transactions for 1794. It exhibits the per centage of alcohol of .825 specific gravity, indicated by each degree of the hydrometer for every five degrees of temperature, from 30° to 80° of Fahrenheit. The usefulness of this table will, it is believed, compensate for its length. Its accuracy is affected by the expansion of the instrument itself, which therefore requires to be investigated. The mean of the best experiments gives .00057 as the expansion in bulk of brass in passing from 32° to 212°. In graduating the hydrometer, the mean temperature of 55° is to be employed; so that the expansion is to be ascertained for twenty-five degrees. This will be .003167, or less than one-thirtieth of a degree; a quantity imperceptible to the eye. Of the other materials used in the construction of hydrometers, glass and platinum expand about half as much as brass, and gold and silver nearly in the same ratio.

TABLE NO. I.

The quantity of Alcohol of the specific gravity of .825 contained in 100 parts of Liquid for every degree of the Hydrometer, and every 5 degrees of Fahrenheit's Thermometer.

	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°
90											99.69
89										99.94	99.17
88										99.42	98.65
87									99.66	98.90	98.12
86								99.87	99.14	98.36	97.58
85								99.35	98.59	97.83	97.04
84							99.55	98.81	98.05	97.28	96.48
83						99.77	99.02	98.27	97.50	96.72	95.91
82					99.98	99.23	98.48	97.72	96.94	96.15	95.33
81					99.44	98.68	97.93	97.17	96.38	95.58	94.75
80				99.63	98.90	98.13	97.38	96.60	95.82	94.99	94.15
79			99.80	99.08	98.33	97.57	96.81	96.03	95.23	94.40	93.55
78		99.97	99.26	98.54	97.79	97.	96.24	95.45	94.64	93.80	92.94
77		99.43	98.70	97.98	97.22	96.43	95.65	94.87	94.04	93.19	92.32
76	99.58	98.88	98.14	97.41	96.64	95.83	95.06	94.26	93.42	92.56	91.68
75	99.03	98.32	97.57	96.82	96.05	95.23	94.45	93.64	92.79	91.93	91.04
74	98.47	97.76	96.99	96.23	95.45	94.62	93.83	93.	92.14	91.27	90.38
73	97.90	97.19	96.40	95.63	94.84	93.99	93.19	92.36	91.49	90.61	89.71
72	97.32	96.53	95.80	95.01	94.21	93.36	92.55	91.71	90.83	89.94	89.04
71	96.72	95.85	95.18	94.39	93.58	92.73	91.90	91.05	90.17	89.27	88.36
70	96.12	95.30	94.56	93.76	92.94	92.08	91.24	90.38	89.49	88.59	87.68
69	95.49	94.74	93.94	93.12	92.29	91.42	90.57	89.70	88.80	87.90	86.99
68	94.87	94.08	93.29	92.47	91.62	90.75	89.89	89.02	88.11	87.21	86.29
67	94.22	93.42	92.63	91.80	90.94	90.07	89.20	88.33	87.42	86.51	85.58
66	93.57	92.76	91.95	91.12	90.26	89.38	88.51	87.63	86.71	85.80	84.86
65	92 91	92.09	91.28	90.43	89.57	88.69	87.80	86.92	86.	85.08	84.13
64	92.25	91.42	90.59	89.72	88.86	87.97	87.08	86.20	85.27	84.35	83.40
63	91.58	90.75	89.88	89.	88.16	87.25	86.36	85.47	84.54	83.61	82.66
62	90.90	90.03	89.16	88.29	87.46	86.52	85.63	84.72	83.79	82.86	81.91
61	90.21	89.31	88.44	87.57	86.71	85.78	84.89	83.97	83.04	82.10	81.15
60	89.48	88.58	87.71	86.83	85.95	85.03	84.14	83.21	82.27	81.33	80.38
59	88 74	87.83	86.98	86.09	85.20	84.28	83.37	82.45	81.50	80.55	79.60
58	87.99	87.08	86.22	85.34	84.44	83.51	82.59	81.67	80.72	79.76	78.79
57	87.24	86.33	85.45	84.58	83.67	82.73	81.81	80.89	79.93	78.96	77 97
56	86.47	85.57	84.69	83.79	82.89	81.94	81.03	80.09	79.13	78.15	77.15
55	85.69	84.79	83.91	82 99	82.09	81.15	80.23	79.29	78 32	77.34	76.33
54	84.90	84.	83.12	82.20	81.29	80.35	79.43	78.40	77.49	76.51	75.51
53	84.10	83.20	82.31	81.39	80.47	79.54	78.60	77.61	76.65	75.67	74.68
52	83.30	82.41	81.51	80.58	79.66	78.72	77 77	76.74	75.82	74.84	73.84
51	82.49	81.55	80.69	79.77	78.84	77.89	76.93	75.96	74 99	74.	73.
50	81.66	80.76	79.85	78.93	77.99	77.04	76.03	75.07	74.11	73.12	72.12
49	80.83	79.93	79.01	78 08	77.14	76.18	75.13	74.18	73.23	72.23	71.24
48	79.99	79.08	78.15	77.22	76.28	75.32	74.30	73.35	72.37	71.36	70.33
47	79.14	78.22	77.28	76.35	75.41	74.46	73 48	72.49	71.50	70.48	69.42

TABLE NO. I. CONTINUED.

	30°	35°	40°	45°	50°	55°	60°	65°	70°	75°	80°
46	78.27	77.36	76.41	75.47	74.53	73.56	72.58	71.58	70.58	69.55	68.49
45	77.40	76.48	75.53	74.59	73.65	72.66	71.67	70.67	69.66	68.61	67.55
44	76.51	75.60	74.63	73.69	72.75	71.75	70.74	69.75	68.72	67.66	66.59
43	75.62	74.70	73.72	72.78	71.84	70.84	69.80	68.82	67.78	66.70	65.62
42	74.71	73.78	72.81	71.85	70.89	69.86	68.84	67.89	66.80	65.74	64.59
41	73.79	72.85	71.89	70.92	69.94	68.88	67.87	66.85	65.83	64.77	63.56
40	72.85	71.90	70.93	69.95	68.96	67.91	66.89	65.91	64.85	63.77	62.77
39	71.90	70.93	69.97	68.97	67.97	66.94	65.90	64.87	63.85	62.76	61.68
38	70.92	69.95	68.97	67.97	66.96	65.94	64.90	63.86	62.84	61.72	60.64
37	69.93	68.96	67.97	66.96	65.95	64.93	63.90	62.84	61.77	60.68	59.59
36	68.92	67.95	66.95	65.93	64.91	63.89	62.86	61.80	60.72	59.63	58.54
35	67.90	66.92	65.92	64.90	63.87	62.84	61.81	60.75	59.67	58.58	57.48
34	66.86	65.86	64.88	63.84	62.80	61.76	60.72	59.66	58.58	57.49	56.38
33	65.82	64.81	63.82	62.78	61.73	60.68	59.63	58.56	57.49	56.39	55.28
32	64.75	63.71	62.74	61.69	60.63	59.58	58.52	57.45	56.37	55.15	54.12
31	63.66	62.61	61.65	60.59	59.53	58.47	57.40	56.33	55.25	54.11	52.96
30	62.56	61.55	60.54	59.47	58.40	57.33	56.25	55.15	54.04	52.91	51.79
29	61.44	60.44	59.42	58.34	57.26	56.18	55.10	53.97	52.83	51.70	50.58
28	60.31	59.29	58.26	57.16	56.07	54.97	53.87	52.74	51.60	50.46	49.32
27	59.16	58.10	57.05	55 97	54.88	53.76	52.63	51.50	50.37	49.21	48.01
26	57.96	56.89	55.81	54.75	53.60	52.48	51.35	50.20	49.06	47.89	46.70
25	56.72	55.65	54.55	53.43	52 31	51.19	50.06	48.90	47.74	46.56	45.38
24	55.45	54.32	53.25	52.11	50.98	49.84	48.68	47.53	46.37	45 17	44.
23	54.15	53.03	51.91	50.78	49.65	48.48	47.30	46.15	44.99	43.79	42.59
22	52.75	51.70	50.54	49.36	48.21	47.02	45.85	44.69	43.51	42.33	41.27
21	51.34	50.31	49.15	47.94	46.76	45.56	44.40	43.23	42.02	40.82	39.58
20	49.92	48.84	47.63	46.44	45.25	44.04	42.87	41.68	40.46	39.29	37.99
19	48.50	47.26	46.09	44.88	43.67	42.46	41.27	40.04	38.83	37.58	36.35
18	46.86	45.65	44.46	43.21	42.01	40.79	39.55	38.30	37.09	35.86	34.62
17	45.21	43.99	42.76	41.47	40.26	39.01	37.77	36.53	35.29	34.05	32.80
16	43.44	42.20	40.90	39.63	38.38	37.13	35.89	34.59	33.40	32.16	30.90
15	41.54	40.24	38.97	37.65	36.37	35.10	33.87	32.59	31.38	30.18	28.93
14	39.38	38.11	36.83	35.48	34.19	32.93	31.71	30.47	29.28	28.10	26.87
13	37.11	35.80	34.48	33.13	31.83	30.62	29.43	28.25	27.10	25.97	24.80
12	34.49	33.14	31.86	30.52	29.30	28.14	27.02	25.92	24.83	23.73	22.69
11	31.44	30.08	28.99	27.74	26.59	25.53	24.52	23.51	22.51	21.50	20.57
10	27.99	26.84	25.88	24.80	23.84	22.89	21.99	21.09	21.07	19.24	18.27
9	24.30	23.40	22.60	21.82	21.07	20.24	19.46	18.64	17.82	16.97	15.97
8	20.53	20.03	19.50	18.90	18.29	17.61	16.92	16.23	15.48	14.72	13.87
7	17.05	16.80	16.49	16.07	15.64	15.05	14.48	13.85	13.18	12.15	11.73
6	13.91	13.84	13.66	13.38	13.03	12 59	12.12	11.56	10.97	10.43	9.63
5	11.18	11.15	11.17	10.18	10.63	10.26	9.85	9.37	8.83	8.25	7.58
4	8.49	8.68	8.65	8.55	8.34	8.04	7.69	7.27	6.76	6.23	5.63
3	6.33	6.42	6.44	6.39	6.13	5.94	5.63	5 24	4.52	4.34	3.72
2	4.20	4.35	4.38	4.35	4.19	3.97	3.68	3.32	2.89	2.39	1.87
1	2.33	2.43	2.45	2.43	2.28	2.08	1.81	1.44	1.10	.87	.74

TABLE NO. II.

The specific gravity corresponding with each degree of the Hydrometer, from 1° *to* 200°, *for liquids lighter, and for those heavier than water.*

deg.			deg.			deg.		
1	.99751	1.00167	38	.91324	1.06761	75	.84210	1.14285
2	.99502	1.00334	39	.91116	1.06934	76	.84032	1.14504
3	.99256	1.00502	40	.90909	1.07143	77	.83857	1.14722
4	.99010	1.00671	41	.90703	1.07334	78	.83682	1.14942
5	.98765	1.00840	42	.90498	1.07527	79	.83507	1.15163
6	.98522	1.01010	43	.90293	1.07720	80	.83333	1.15384
7	.98280	1.01180	44	.90090	1.07913	81	.83160	1.15607
8	.98039	1.01351	45	.89888	1.08108	82	.82987	1.15830
9	.97799	1.01523	46	.89686	1.08303	83	.82816	1.16054
10	.97561	1.01695	47	.89485	1.08499	84	.82645	1.16279
11	.97324	1.01867	48	.89286	1.08696	85	.82474	1.16548
12	.97087	1.02041	49	.89087	1.08711	86	.82304	1.16731
13	.96851	1.02214	50	.88889	1.09091	87	.82135	1.16959
14	.96618	1.02389	51	.88691	1.09289	88	.81967	1.17187
15	.96385	1.02564	52	.88495	1.09489	89	.81800	1.17416
16	.96154	1.02740	53	.88303	1.09689	90	.81633	1.17647
17	.95923	1.02915	54	.88106	1.09890	91	.81466	1.17878
18	.95694	1.03092	55	.87912	1.10092	92	.81301	1.18110
19	.95465	1.03270	56	.87719	1.10294	93	.81136	1.18343
20	.95238	1.03448	57	.87527	1.10495	94	.80972	1.18577
21	.95012	1.03627	58	.87336	1.10701	95	.80808	1.18812
22	.94787	1.03806	59	.87146	1.10906	96	.80643	1.19047
23	.94563	1.03986	60	.86956	1.11111	97	.80483	1.19284
24	.94340	1.04167	61	.86768	1.11317	98	.80321	1.19522
25	.94118	1.04348	62	.86580	1.11524	99	.80161	1.19765
26	.93897	1.04529	63	.86393	1.11732	100	.80000	1.20000
27	.93677	1.04712	64	.86207	1.11940	101	.79843	1.20405
28	.93458	1.04895	65	.86021	1.12149	102	.79681	1.20482
29	.93240	1.05078	66	.85837	1.12359	103	.79523	1.20724
30	.93023	1.05263	67	85653	1.12570	104	.79365	1.20967
31	.92807	1.05448	68	.85470	1.12782	105	.79208	1,21212
32	.92593	1.05634	69	.85288	1.12996	106	.79051	1.21457
33	.92379	1.05821	70	.85106	1.13208	107	.78895	1.21703
34	.92166	1.06007	71	.84926	1.13421	108	.78740	1.21951
35	.91954	1.06194	72	.84746	1.13636	109	.78585	1.22199
36	.91743	1.06383	73	.84567	1.13852	110	.78431	1.22449
37	.91533	1.06572	74	.84388	1.14068	111	.78278	1.22699

TABLE NO. II. CONTINUED.

deg.			deg.			deg.		
112	.78125	1.22951	142	.73801	1.31004	172	.69930	1.40187
113	.77959	1.23203	143	.73665	1.31291	173	.69808	1.40515
114	.77840	1.23457	144	.73529	1.31579	174	.69686	1.40845
115	.77669	1.23711	145	.73394	1.31868	175	.69565	1.41176
116	.77519	1.23967	146	.73260	1.32158	176	.69444	1.41509
117	.77369	1.24223	147	.73126	1.32450	177	.69324	1.41844
118	.77220	1.24481	148	.72992	1.32743	178	.69204	1.42180
119	.77071	1.24740	149	.72859	1.33037	179	.69084	1.42518
120	.76923	1.25000	150	.72727	1.33333	180	.68966	1.42857
121	.76775	1.25261	151	.72595	1.33630	181	.68846	1.43198
122	.76628	1.25523	152	.72464	1.33929	182	.68728	1.43541
123	.76482	1.25786	153	.72333	1.34228	183	.68611	1.43885
124	.76335	1.26050	154	.72202	1.34529	184	.68493	1.44231
125	.76190	1.26316	155	.72072	1.34831	185	.68376	1.44578
126	.76045	1.26582	156	.71942	1.35135	186	.68260	1.44987
127	.75901	1.26850	157	.71813	1.35440	187	.68143	1.45278
128	.75757	1.27118	158	.71684	1.35747	188	.68027	1.45679
129	.75614	1.27388	159	.71556	1.36054	189	.67912	1.45985
130	.75472	1.27659	160	.71428	1.36364	190	.67797	1.46341
131	.75329	1.27932	161	.71301	1.36674	191	.67682	1.46699
132	.75188	1.28205	162	.71174	1.36986	192	.67567	1.47058
133	.75047	1.28480	163	.71048	1.37300	193	.67453	1.47420
134	.74906	1.28755	164	.70922	1.37614	194	.67340	1.47783
135	.74766	1.29032	165	.70796	1.37931	195	.67225	1.48148
136	.74627	1.29310	166	.70671	1.38249	196	.67114	1.48515
137	.74488	1.29589	167	.70546	1.38568	197	.67002	1.48884
138	.74349	1.29892	168	.70422	1.38888	198	.66889	1.49254
139	.74211	1.30152	169	.70299	1.39211	199	.66778	1.49626
140	.74074	1.30435	170	.70175	1.39535	200	.66667	1.50000
141	.73937	1.30719	171	.70052	1.39860			

Value in degrees of the New Scale.

Sulphuric ether (Lowitz) .632,	233°
Dr Paris .739,	141
Dublin .765,	123
Edinburgh .758,	128
Spirit of nitrous ether,	71
Aq. ammoniæ, Dublin .936,	27
London .960,	17

Muriatic acid 1.16, 83°
Nitrous acid 1.50, 200
Sulphuric acid 1.848, 275
100 degrees of the brewer's saccharometer 1.100 sp. gr. 54½
38 degrees of Baumè's hydrometer for spirits, 83½
18 degrees of do. 24½
3 degrees of the new scale equals 1 of Baumè; to reduce it to Baumè's, divide by 3 and add 10.
72 degrees of Baumè's hydrometer for salts, equals 300°
24 degrees of do. 100
To reduce the new scale to Baumè's, multiply by 12 and divide by 50.

Pinus Canadensis, Willd. Abies Canadensis, Mich. Sylv. A large tree belonging to the natural order Coniferæ. Monoecia, Monadelphia of Linnæus. Officinal Resin Pini Canadensis. Hemlock Resin. By Charles Ellis.

This resin is the product of the pinus Canadensis, a tree known only in the United States by the name of hemlock spruce, and in Canada by the French is called pèrusse.

The resin which exudes from it was first introduced into this city about ten or twelve years since, and was obtained in this state near Silver Lake, Susquehannah county.

Since then there have been annually small quantities brought from the northern parts of Pennsylvania. But its history even here has been but little known, and still less elsewhere. And as every thing connected with the pharmacy of our own country is interesting, and ought particularly to engage our attention, I have attempted to give a short account of the article itself, the tree from which it flows, and the mode of obtaining it.

For the history of the tree, I have chiefly consulted Mi-

chaux's North American Sylva, and am indebted to the politeness of Mr Christian, an intelligent gentleman of Susquehannah county, for some practical details respecting the resin.

The pinus Canadensis is a native of North America only, and belongs to the coldest regions of our continent, beginning to appear about Hudson's Bay, lat. 51° north. In the vicinity of Lake St John, and near Quebec, the forests are filled with it, and in Nova Scotia, New Brunswick, Maine and Vermont, it forms three-fourths of the evergreen woods, of which the other fourth is composed of the abies nigra or black double spruce.

It is also abundantly met with in the northern parts of Pennsylvania and New York. Further south it is confined to the Aleghany mountains, and even there to the borders of torrents, and to the most humid and gloomy situations. Very moist ground is not, however, most congenial to its growth, but it is often seen flourishing amongst beech and sugar maple, in a soil well adapted for the culture of wheat.

The hemlock spruce is always taller and thicker than the black spruce. It attains the height of seventy or eighty feet, and a circumference of six to nine feet; preserving the same diameter two-thirds of the length of its trunk. But if the number and closeness of its concentric layers afford a certain criterion of the longevity of trees, and the rapidity of their vegetation, it must be nearly two centuries in acquiring such dimensions.

The leaves are six to eight lines long, very narrow, flat and downy at their unfolding. The cones are a little longer than the leaves, oval, pendulous and situated at the extremity of the branches.

Of all the great resinous trees of America, its wood is of least value; but this disadvantage is greatly compensated by the invaluable property which the bark possesses in its tannin; particularly as in those sections of our country where it is most abundant, the oak is least so. And although a preference be given to the bark of the quercus falcata, that of the hemlock spruce in some parts of the United States is almost entirely consumed in the tanneries.

Mr Michaux states, that this species of fir contains very little resin, having observed that none of any consequence was apparent upon the trunks of trees that had long been deprived of their bark. In comparison with the species from which the common turpentine exudes, this remark is correct; but the circumstances under which the resin flows from the former, so materially differ from the latter, that any inference drawn from a transient observation of the tree, would lead to an erroneous conclusion. The hemlock resin can never be obtained by incisions in the trunk, (the mode of procuring turpentine), but is invariably the result of spontaneous exudation, generally at the knots or excrescences, which are numerous on this tree. The heat of the sun causes it to distil through the bark, and it hardens upon the surface.

It is always obtained from old trees, and generally in a state of approaching decay. When observed to exude from such as are healthy and vigorous, the inference is that they will not live long, and it is considered in the country a certain forerunner of premature death. The proportion of trees from which any resin can be procured is not more than one in one hundred ; and to this circumstance we may attribute the scanty supply always found in our market. The mode of obtaining it employed by the inhabitants is as follows. Trees are selected upon whose bark the resin is encrusted, which are easily designated by a streak of a dark brown colour on one side of the tree, from near the top to the bottom. These are cut down, and the bark upon which the resin has hardened stripped off and thrown into a kettle containing water, with weights placed upon it to prevent its floating. By boiling the water, the resin is melted and rises to the surface, is skimmed off and thrown into cold water. It is then put into a coarse linen bag and submitted to a second ebullition, treating it as in the former instance, which deprives it of many of its impurities, and in this state we receive it from the country. The quantity procured from such as are considered *good* trees, is from six to ten pounds, the average produced from four to five. The colour of it as it exudes is nearly white. It har-

dens immediately, and changes to yellow, brown, and sometimes nearly black.

The well known fact is noticed by Michaux, that the large and bushy top of the hemlock receives and retains quantities of snow; from the weight of which and from its bleak and elevated exposure, the limbs are broken off and fissures produced in the trunk: thus is brought about a tendency to decay, and this spontaneous exudation of resin is probably the effect of a diseased or altered action in the vital powers of the tree.

The hemlock resin, or *gum*, as it is generally but very erroneously called, as received from the country, is in masses, very brittle, and of a yellowish brown colour; the heat to which it is generally submitted by the apothecary, to deprive it of its impurities, renders it a few shades darker.

Owing to its adhesiveness and stimulating properties, it has acquired some confidence and popularity as a strengthening plaster; and is, when employed in this way, quite equal, if not superior, to the Burgundy pitch. In its chemical properties it is essentially a resin, combined with a small quantity of volatile oil, and is, like other resins, heavier than water, having a specific gravity of 1.034.

One part of it is soluble in two parts of warm and three of cold alcohol. It is highly inflammable, burning with a thick black smoke, and resembles in many respects the resin of the pinus australis, or common turpentine, but differs from it materially in its consistence and odour. The latter is so peculiar, that once observed it may be readily recognized. Oil of turpentine dissolves barely sufficient of it to acquire its colour, but it is entirely soluble in sulphuric ether. At a temperature of 198° it fuses, but requires a heat of 300 or 350, when subjected alone in a retort to distillation, to deprive it of its essential oil, which is in very small quantity. Distilled with water or alcohol the products were strongly impregnated with its odour. I have found by pulverising and passing it through a sieve, it may be deprived of the bark of the tree, with more or less of which it is invariably mixed. This is, however, but an imperfect mode of purifying it, as without great care part of the bark will also be reduced to powder. The operation of strain-

ing, although attended with some difficulty, on account of the great adhesiveness of the resin, and the rapidity with which it cools, is nevertheless the only economical and effectual method, and may be readily accomplished over boiling water, or by means of professor Hare's apparatus for facilitating filtration by heat, described in his chemistry. It may also be purified by dissolving it in alcohol, filtering the solution, and evaporating it over a water bath. This plan is too expensive.

On the Ipomœa Jalapa. By Daniel B. Smith.

The plant from which the officinal jalap is obtained, has always been the subject of much uncertainty. It was supposed at one time to be a species of briony, and at another of rhubarb, and has also, even to the present day, been confounded with the mechoacan. Linnæus at one time attributed it to a species of mirabilis, to which he gave the name of mirabilis jalapa. But he afterwards changed his opinion, and supposed it to be the convolvulus jalapa, which he thus describes, "Convolvulus foliis difformibus, cordatis angulatis oblongis lanceolatisque, caule volubili, pedunculis unifloris."

The first writer by whom this celebrated drug was noticed was Monard, who wrote, about the year 1570, a history in Spanish, of Remedies brought from America. He notices the distinction between the jalap and mechoacan, of which latter plant he gives several plates. His description of the two roots is clear and well defined, and may be seen in Coxe's American Dispensatory, article jalap.

Thiery de Menonville, who visited the native country of the jalap in 1777, described a plant which he found growing near Vera Cruz, and asserts it to be identical with that from which the jalap is obtained.

This plant was found to correspond in every particular with one which the elder Michaux had sent to the Botanic garden

N. Y. ACADEMY,
LIBRARY.
OF MEDICINE.

Fig: 1.

Fig: 5.

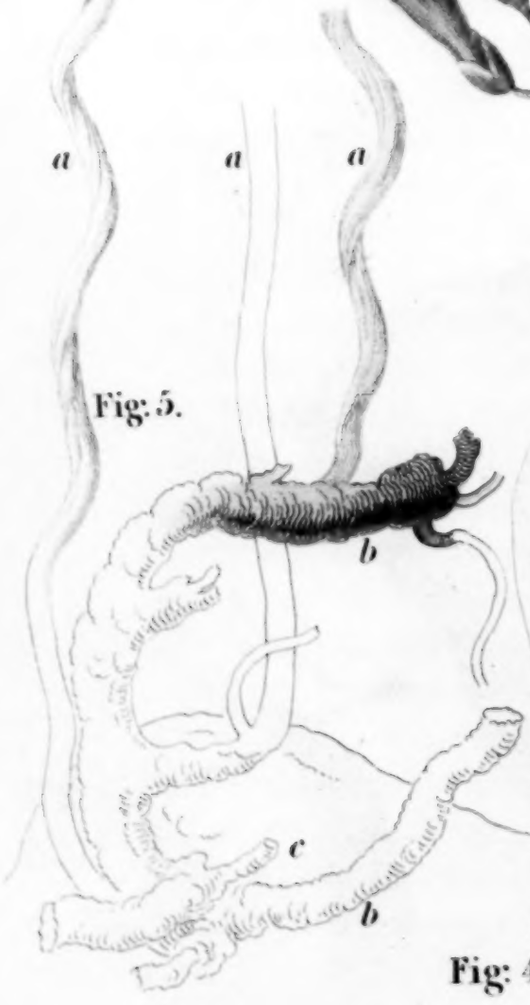

Fig: 2.

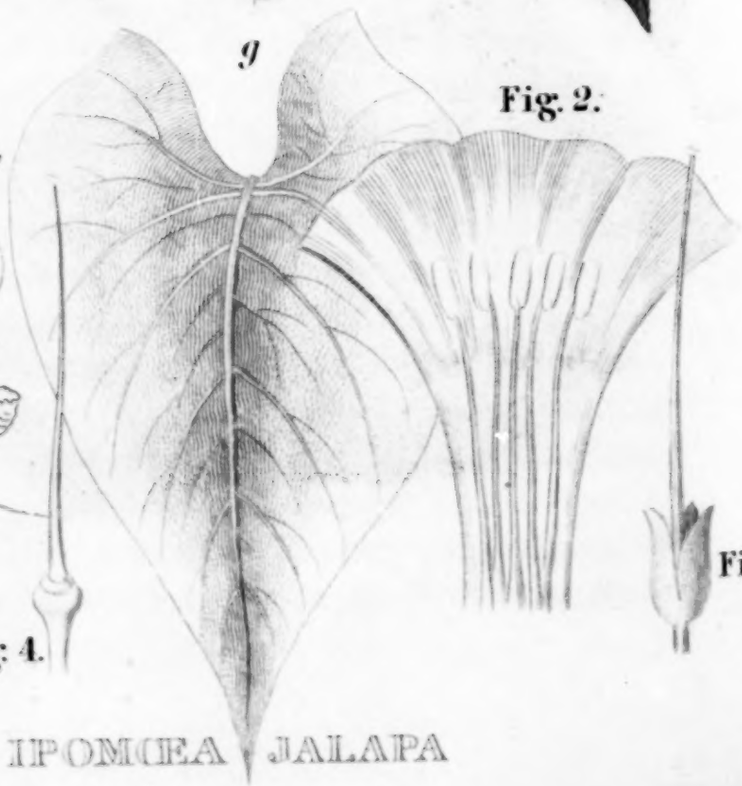

Fig: 3.

Fig: 4.

IPOMŒA JALAPA

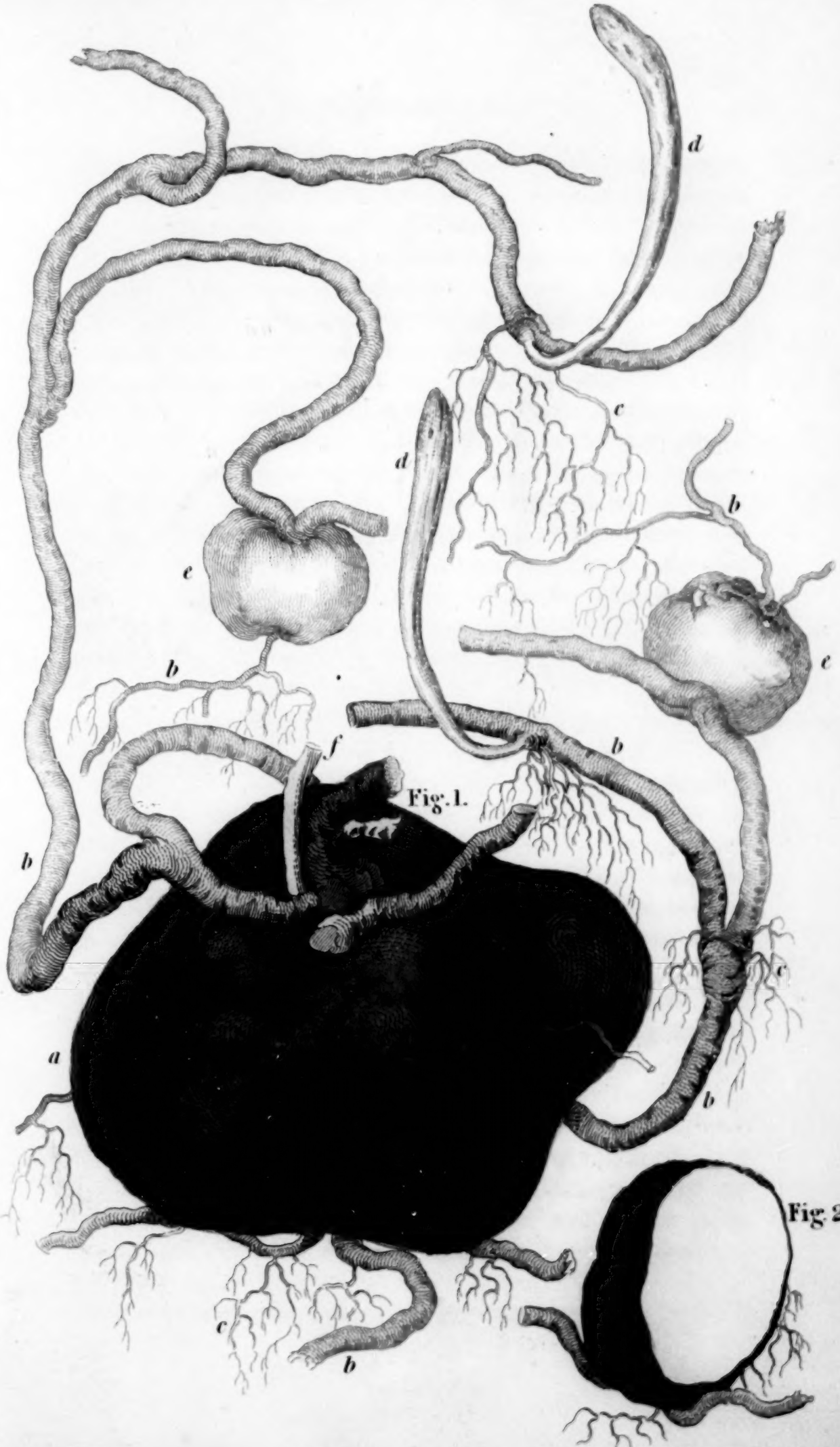

Fig. 1.

Fig. 2.

of Paris from East Florida. Michaux's plant is a true ipomœa, and is called by him ipomœa macrorhiza, or large rooted ipomœa. Persoon adds a query to Michaux's description, whether it is not the convolvulus jalapa of Linnæus? Desfontaines described and figured the plant of Michaux, in the second volume of the Annales du Museum, as the officinal jalap, and asserts it to be a native of the southern United States. It is also figured as such in Curtis' Botanical Magazine, T. 1572. This plant, which appears to be the convolvulus mechoacana of Linnæus, is very probably that which yields the mechoacan, and which was formerly considered as a briony—Bryonia Mechoacana Nigricans. As this root was frequently intermixed by the collectors with the true jalap, it is not surprising that Thiery de Menonville should have confounded the two species together, nor that Persoon and Desfontaines were led into the same error. These circumstances further render it probable, that the plant which has been cultivated in Europe, has not been the true jalap. That which Dr Woodville has figured in his Medical Botany, was introduced into the royal gardens at Kew by M. Thouin, and it is remarked by Nuttal, that it "much more nearly resembles the convolvulus panduratus, (particularly an entire leaved variety of the western states), than Michaux's large rooted ipomœa." The specimen in the Jardin des Plantes, is undoubtedly Michaux's species, for the root was brought from Charleston, where that botanist successfully cultivated it. Pursh, in his Genera of North American Plants, describes the macrorhiza by the name of ipomœa jalapa, and considers it as established, that it is the officinal species. He was confirmed in this opinion by seeing the living plant raised from some seeds collected in Mexico, "which, says he, proved in every respect to be the convolvulus jalapa of Linnæus, as well as ipomœa macrorhiza of Michaux, with only the small difference of colour, which was a light purple." Notwithstanding all this weight of authority, it is nearly certain that Michaux's plant is the mechoacan and not the jalap, for the root sometimes weighs from fifty to sixty pounds, a size which the jalap does not attain.

The obscurity which has so long hung over this subject, it

may be hoped, is at length dissipated, and it may be considered as a settled question. Through the kindness of a friend, Dr Redman Coxe, of the University of Pennsylvania, in the summer of 1827, obtained a number of plants in a growing state from Xalapa, and he has successfully cultivated them in his garden since that time. The following extracts from a memoir of the learned professor, published in the American Journal of the Medical Sciences for February 1830, are nearly conclusive on the point of the identity of his plant with the true jalap.

"It is not my intention to take up much time in the consideration of the subject which this paper is intended to embrace, viz. the real character of the plant that affords us the officinal jalap. It will be seen by referring to the preceding observations, that although it has been one of the most prominent and approved articles of the Materia Medica for nearly two centuries, the absolute character of the plant producing it has been involved in obscurity. Desirous of bringing it fully to light, I attempted repeatedly to obtain the living plant from its domestic source, but unfortunately was unsuccessful in my endeavours, until, in the year 1827, I obtained, by the kind attention of Mr Fontanges, a number of the plants in a growing state, which he had the goodness to procure from Xalapa. The following statement may be considered as a diary of the facts which have since come to my knowledge. During three years successively, the plants have grown with great luxuriance in my garden; and, with the exception of fully ripening their seeds, have abundantly repaid me for the anxious interest I felt respecting them.

"On the 8th of June 1827, I received the plants from Mr Heyl, to whose care they had been consigned.

"The shoots, eight or ten in number, I found to have suffered from the voyage. They resembled the *convolvulus*, but of a sickly growth, about six to ten inches high, and with several small cordate leaves upon each stalk. Supposing an immediate transplantation might benefit them, I put out two or three of the bulbs or tubers into the open ground on the same day, and planted some others in pots, in the *same earth* in which

they had reached me. All of these last unfortunately died: this I presume must have arisen from the earth being impregnated with salt water, and which was probably the cause of the primary unhealthy state of the whole number. It was fortunate therefore that I had placed some in the garden, where I soon had the pleasure of seeing them give out fresh and vigorous shoots, which grew rapidly, so that by the beginning of July they began to wind around a string I had prepared for them. They continued to grow with increased vigour, the leaves enlarging as the stalk advanced; and by the beginning of September they had attained a height of about twelve feet, several buds beginning to put forth very slowly, and not opening in flower until the beginning of November. Indeed, owing to the frost, only one of them came to perfection; and this one was secured from the same fate with the elegant buds that were on the point of expanding, by cutting off a section of the plant and putting it into water in a warm room: from this flower the first drawing I had made was taken, having a beautiful lilac or carnation waxy transparent colour.

The leaf differs entirely from that given by Woodville in his Medical Botany; as does the whole appearance of the flower: but I have since found much diversity in the leaves, as may be seen in the engraving; yet although thus differing among themselves, they were *always* cordate. At each leaf two small buds appeared, and in a few instances three, on the uppermost branches or offsets, each on its own particular footstalk. The common *convolvulus* or *ipomœa* of our gardens, I found to have a diversity of buds, even up to five, arising from the same part of the plant as in the jalap, viz. from the angle formed by the leaf with the stem.

Excepting the leaves, the plant appeared scarcely more than a reddish-brown thread, about the size of a crow-quill, to the height of twelve or fourteen feet; from thence, at the junction of nearly every leaf, an off-set originated, growing luxuriantly to the length of several feet: the whole length of the plant must have been twenty to twenty-five feet, the numerous offsets springing forth nearly the whole extent, and each in turn affording axillary offsets. There were probably about twenty

buds of different sizes, of the most beautiful appearance, that were destroyed by the frost; the longest, by admeasurement on October 23d, including the peduncle and calyx, fully two inches. The leaves were throughout solitary and alternate, cordated, and from one to three inches long, including the footstalk. The stem, besides twining round its support from left to right, having a strong disposition to twist upon itself throughout.

The frost destroyed the flowers before even evincing a disposition to seed, and as the cold increased, being fearful of trusting the roots during winter to the open air, I took them up on the 21st of November, and planted them in a pot in the house on the same day; keeping them in a warm room the whole winter, and slightly moistening the earth occasionally.

On the 12th of April 1828, I found three small shoots beginning to appear, which by the 29th of the month were between two and three inches high; on which day I planted one out in the open air. On the 7th of May small cordate leaves began to appear; the slender reddish stem had commenced twining around an adjoining twig; and, counting the convolutions, was now full five inches in height. By the 17th it had grown to fully twelve inches, the leaves augmenting in size and number.

June 1. Including the convolutions, it is now nearly four feet high, and by the 8th was nearly six inches higher, extremely vigorous, and beginning to display the appearance of small offsets from the upper leaves. In breaking off a leaf, I found a milky juice exude in small amount, and of little taste.

16th. It is now between six and seven feet high, and has about fifty vigorous leaves of a vivid green.

July 1st. Now upwards of eight feet high, with five or six vigorous offsets from the axillæ of the upper leaves, and fresh ones forming.

This plant continued to thrive vigorously, and probably reached the height of twenty feet. Several minute buds made their appearance; but not one came to perfection, either on this, or the others, which grew with equal luxuriance; so that

I was completely disappointed in my expectation of becoming acquainted with the seeding of the plant, from its having had a start of growth many weeks beyond that of the preceding year. The frost coming on, I took up the pot in which it was planted, and preserved it in the house during the winter, the stem gradually dying down. In this state it continued, being occasionally slightly watered, until early in the month of April 1829, when I took it up, and found it considerably enlarged, and left it exposed to the air for some days, during which time it became wrinkled and seemed drying into the corrugated form in which the imported root appears: I therefore replanted it, and placed it in the garden, and on the 18th of April I noticed it shooting from the earth. By the 25th, a small stem, about three inches long, was beginning to twine around an adjoining stick, and the same day a second shoot made its appearance. May 4th. A small cordate leaf appeared on the first stalk, now nearly a foot high. It continued rapidly to increase, and by the 27th of June it had numerous offsets from the junction of the upper leaves with the stem, being now about fifteen feet high; and on these offsets, fifteen or twenty buds seemed to be progressing, of different sizes, so that by comparing the statements of the preceding years, it will be found to have far advanced before them.

The storms we experienced on and about the 4th of July of this year, extinguished my anxious expectations, by beating off every bud then upon the plant, although many very vigorous fresh offsets put forth from the main stem, as it progressed in height. By the 20th of August, it was full twenty feet in height, but without the appearance of a new bud. Having given up all hopes of its efflorescence, I paid but little attention to it; but about the middle of September I was agreeably surprised at perceiving several small buds pushing forth, which, by the 20th of October, had greatly augmented, perhaps not less than one hundred, and some of the most forward being now nearly one inch and a half in length.

October 23d. I measured one, and found it, including its footstalk, to be three inches long; and on this day one of the flowers expanded, continued open all that night and the next

day, and falling off on the 25th, when the seed-vessel, to which the pistillum continued attached, was of a considerable size. Another flower opened on the 25th, and fell off the next day, leaving a seed-vessel of sufficient size to induce me to hope that seed might be perfected. After this, probably fifteen or twenty buds flowered very beautifully; and from one foot-stalk, in some places two buds were seen, in others, three.

All my expectations were however blasted by the severe frost that came on about the middle of November, and completely destroyed every sign of life in the plant; which I was unable to remove into the house, from the complete intertwining of the offsets in every part, amongst themselves and the adjoining plants. The pot of earth, moreover, in which were the tubers, was frozen throughout, and I of course expected they were killed; I took it however into the house, and allowed it to thaw gradually in a cool room—and in four or five days, with a heavy heart, I removed the earth, and found my tuber vigorous and healthy, increased greatly in size, nearly as large as an orange, and in every respect resembling in colour and appearance a dark skinned potato. Numerous suckers proceeded from it, from which fine radicles arose, and three new tubers were formed of the size of nutmegs; several offsets were shooting towards the surface of the earth; all which, after procuring their delineation, I planted again in about a week, where they now remain for further elucidation.

The skin of the tuber is very thin, and the whole habitude of this interesting plant, below the surface, seems closely allied to the common potato. Dark as is the appearance of the dried tuber as used in medicine, when fresh, its internal aspect is as white as a potato, but soon is clouded by atmospheric exposure.

I have now given, as concisely as I could, all the particulars I have learned of this long disputed plant; which turns out to be an *ipomœa* and not a *convolvulus*. The difference indeed is trifling—but it is no small matter in a disputed point, to completely settle the ground of controversy. I had a drawing made of my first year's flower, and this year another; to this last I was enabled to add the tubers and their offsets, so that

nothing remains to be known respecting the plant, but the character and number of the seeds; this I hope to accomplish another season. The engraving accompanying this statement is an intermixture of the two drawings above mentioned, in order to give a view of the diversity of the leaves, in the two cases.

For the botanical description, I am indebted to my friend Mr Nuttall, so well known for his extensive attainments in the science of botany. It might possibly have been more complete had he seen it in its state of perfection. The following is his description of it:—

IPOMŒA JALAPA.—*Root.* A roundish, somewhat pear-shaped tuber; externally blackish; internally white when recent —and warty*; sending out long fibres from its lower point†; and also from the upper root stalks produced, which appear to be a portion of a persisting succulent stem.

Stem. Round, (apparently), herbaceous, of a bright brown colour‡, and very much inclined to twist; and, as well as the whole plant, perfectly smooth.

Leaves. Heart shaped, entire, smooth, conspicuously acuminated, and deeply sinuated at the base: the lower ones sometimes nearly hastate, or with diverging angular points: the under surface prominently veined: the footstalks often nearly the length of the lamina of the leaf, from the point of its insertion.

Peduncles. About the length of the petioles, bearing commonly *two*, more rarely *three* flowers.

Calyx. Without bracts, five-leaved, obtuse; two of the divisions external.

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* This appears rather the result of desiccation—for when fresh taken from the earth, it is not more so than the potato. Mr N. had the opportunity of seeing it only after it had been some time exposed to the air. C.

† This was the case in the tuber examined by Mr N. but the engraving will show, that, as in the potato, there are many eyes from which these fibres are transmitted, often as thick as a quill, and from which, in various places, proceed the radicles that nourish the plant. C.

‡ Rather reddish when fresh—Mr N. having the opportunity of only examining the dry stalk. C.

Corolla. Funnel-formed, wholly lilac purple, (and of a waxy semitransparency. C.)

Stamina. Five; anthers oblong, white; somewhat exserted.

Pistillum. Germ slender and attenuated into the style. (Observation on an imperfect flower. C.) *Stigma.* Capitate, simple.

Seed. As yet unknown.

Explanation of the Plates.

Plate I. Fig. 1. The plant winding round its support.

a. A full expanded flower of the natural size.—Connected with it (*aa*). is seen the germen and pistillum of another flower, the corolla of which had fallen off.

b. A bud nearly on the point of expanding, with another less advanced.

c. Three buds of different sizes—all proceeding from one common footstalk connected with the stem—each, however, having a separate one of its own.

d. A leaf as it appeared on the plant of 1827—cordate—but varying much from the leaves in 1829—upper surface.

e. Leaf of the plant in 1829—upper surface.

f. Leaf of the plant in 1829—lower surface.

g. Leaf separate—of largest size.

Fig. 2. The flower divided longitudinally, and opened, to show its five stamina.

Fig. 3. The pistillum and its capitated stigma, together with the calyx.

Fig. 4. The pistillum, showing its junction with the germen, in an unexpanded flower, after removing the calyx.

Fig. 5. The stem as it issues from the earth, showing its connexion with the stolones springing from the tuber.

a. The stem.—*b.* Stolones, or suckers.—*c.* Tuber in outline.

Plate II. Fig. 1. *a.* Tuber—third year's growth—natural size.—*b.* Stolones arising from the tuber.—*c.* Radicles sent off from the stolones for the nourishment of the plant.—*d.* Small shoots from the stolones, about to emerge from the earth.—*e.* Small tubers from the stolones, of this year's growth.—*f.* Stem.

Fig. 2. A tuber cut in half, in order to show its internal white appearance, when fresh.

☞ In order to test the purgative power of the bulb, I sacrificed one of the smaller, which when dried yielded me thirty grains of powder—of this, twenty grains were given to a healthy person, and purged him twice, producing watery stools, with some griping.

Ten grains, given to another healthy individual, produced no effect. It may, therefore, so far as this experiment goes, be regarded as equal in power to the imported root.

By comparing the foregoing botanical description by Nuttall, with the following, which are given in Curtis' Botanical Magazine, and which refer unquestionably to the plant of Michaux, there can be no doubt that these species are entirely distinct. It is surprising that Dr Coxe, with all these facts before him, should have called his plant ipomœa jalapa vel macrorhiza. Should further research establish the fact that Dr Coxe's is the true jalap plant, it will be entitled to the name ipomœa jalapa, and at all events can never be confounded with the ipomœa macrorhiza.

CONVOLVULUS JALAPA.

Pentandria Monogynia.

Cor. campanulata plicata, stigmata 2, caps; bilocularis: locu-lis dispermis.

Specific Character and Synonyms.

Convolvulus jalapa; foliis cordatis repandis integris lobatisve *subtus lanatis*, pedunculis 1—3-floris, pedicellis petiolisque biglandulosis semine lanigero.

Convolvulus jalapa; caule volubili, foliis ovatis subcordatis obsolete repandis subtùs villosis, pedunculis unifloris.—*Hort. Kew.* 1. *p.* 211. *ed. alt.* 1. *p.* 332. *Willd. Sp. Pl.* 1. *p.* 860.

Convolvulus jalapa; caule volubili, tuberculoso; foliis cordato-ovatis, subrugosis, subtùs villosis, integris aut lobatis; pedunculis uni vel multifloris: filamentis basi tomentosis; semine lanigero.—*Desfont. in Annales du Mus. d'Hist. Nat.* 2. *p.* 126. *t.* 40. *et.* 41.

Ipomœa macrorhiza; radice crassissima; foliis subùts tomentosis, cordatis, simplicibus lobatisque, plicatis; pedunculis subunifloris; calycis foliolis ovalibus muticis: corolla alba grandi; seminibus prolixè lanuginosis.—*Michaux, Fl. Bor. Am.* 1. *p.* 141.

Ipomœa jalapa; pubescens; foliis cordatis integris lobatisque plicato rugosis, pedunculis 1—3-floris, foliolis calycis ovalibus, muticis, corollis campanulatis, seminibus prolixè lanuginosis, radice crassissima.—*Pursh. Fl. Bor. Am. p.* 126, *inedit.*

Curtis adds that his figure was taken from a plant raised by A. B. Lambert, Esq. from seeds received from Mexico.

"The jalap was carried from the neighbourhood of Vera Cruz to Jamaica, by Dr Houston, but was neglected and lost.

"Seeds sent to Miller by Dr Houston, grew in the apothecaries' garden, and the plant is described in the sixth edition of the Gardener's Dictionary, published in 1733; but the leaves, probably from mistake, *are there said to be smooth.*"

The root of the jalap occurs commonly in transverse slices, and in egg-shaped, somewhat pointed, entire tubers, covered with a very thin, wrinkled brown cuticle. That which is hard, heavy, compact and breaks with a resinous fracture is the best, and the tubers are to be preferred as not liable to be adulterated, which the jalap in slices frequently is.

The fracture of good jalap is resinous, of a yellowish gray colour, interspersed with deep brown concentric circles. It has a sweetish heavy odour when broken, and a sweetish, slightly pungent taste. Its powder is of a pale brownish yellow colour, very nauseous to the taste, and strongly affecting

the throat and nostrils, when received with the air in breathing.

This root has been analysed by Cadet de Gassicourt, who made it the subject of an inaugural dissertation. According to this chemist, 500 parts of jalap contain :

Resin - - - - - -	50.
Water - - - - - -	240.
Gummy extract - - - -	220.
Fecula - - - - - -	12.5
Albumen - - - - - -	12.5
Phosphate of lime - - -	4.
Muriate of potash - - -	8.1
Subcarbonate of lime, potash and iron	5.
Silex - - - - - -	2.7
Loss - - - - - -	17.
Total - - -	500.

Journal de Pharmacie, 1817, *p.* 495.

The elder Henry, chief of the central Pharmacy of Paris, has also published a comparative analysis of light, heavy and worm-eaten jalap, merely giving the proportions of extract, resin, and residue. His results are as follows :

	Extract.	*Resin.*	*Residue.*
Sound jalap -	140	48	210
Light jalap -	75	60	270
Worm-eaten jalap	125	72	200

He infers from these experiments, that the larvæ which feed upon the jalap, eat only the amylaceous part, without attacking the resin, and the worm-eaten root is therefore to be preferred for the preparation of the resin.

The jalap which is sold in commerce is frequently adulterated. All the older books mention briony root as one of these adulterations, but I am not aware that it is now used for that purpose. The mechoacan, it is also stated, is frequently

mixed with the true jalap, and may be known by the spongy texture and white colour of the internal part. I have seen parcels of root of this description, which I suppose must be the mechoacan. It is a dried tuber, larger than those of the jalap, externally of a smoky brown colour, and very much wrinkled, though not so minutely as the jalap.

It is also said by Bussy and Boutron Charlard, in their treatise on the falsification of drugs, that jalap is sometimes mixed with a substance which appears to be a species of agaric. It is in shapeless masses, weighing one or two ounces, light, strongly wrinkled, of a brown colour on the exterior, and internally of a rose colour, marbled with white, of a loose texture, and without much taste or smell. Divided in small fragments, and placed in contact with alcohol, the liquid acquires a deep yellow colour. The watery decoction is of a beautiful red colour, which most of the acids sensibly weaken.

A root has been recently brought to this market in considerable quantities, and sold under the name of jalap, which is evidently a spurious drug. It is a spindle-shaped root, full of strong thick fibres, arranged in concentric rings, and is transversely sliced in the same manner as jalap. The colour externally is a deep smoky brown, and the bark is much wrinkled longitudinally. The fracture is rough and uneven, of a gray colour, passing into a light reddish brown, and mottled or rather streaked with light ash-coloured waving lines, among which the strong, coarse, white fibres are conspicuous. I have not had an opportunity of comparing the chemical relations of this root with the jalap, any further than to observe that the precipitate formed in an aqueous infusion by sub-acetate of lead is copious, of a brownish green colour, while that by the same salt in an infusion of jalap is of a yellowish gray colour. The reader will perhaps be struck, in reading this description, with the resemblance of this root to that described in the following article, extracted from the Revue Medicale for September 1829.

Male Jalap.—M. Chevallier read a letter to the Royal Society of Medicine, from M. Ledanois, a French apothecary travelling in Mexico, and dated from Orizava. M. L. an-

nounces a new kind of jalap, by the name of *male jalap*, which is found extensively in the country, and possesses strong purgative powers. He gives a short description of the plant which furnishes it; *it is very hairy*, and has *pale* leaves: that of the common jalap is smooth, of a bright green, and has a climbing stem. The male jalap presents fibrous, *spindle-shaped* roots, some twenty inches long, whilst the common jalap has tuberculous ones. M. L. proposes to ascertain whether this is a *convolvulus*, (for some botanists have made it an *ipomœa*), and if the male jalap differs from it, as a learned botanist thinks, only from the diversity of locality modifying its forms. M. L. gives the following analysis of the male jalap from experiments on 1000 parts.

Resin - - - -	80
Gummy extract - - -	256
Starch - - - -	32
Vegetable albumen - -	24
Woody fibre - - -	580
	972

The incinerated root presented muriates and carbonates of lime, of potass, and of magnesia, with some traces of iron and some other residua, trifling in quantity: this medicine besides is active and sure.

Observations on Seneca Oil. Read before the Philadelphia Chemical Society, 11 mo. 10th, 1829. By Samuel Allinson, Jun.

The article known in commerce by the name of seneka oil, though proximately a mineral, is most probably of ultimate vegetable origin. It exudes from soils reposing on beds of bituminous coal, and is found on the surface of springs and stand-

ing water in various places in the states of New York, Pennsylvania, Ohio and Virginia.

It is of a brownish black colour by reflected, and of a deep red, when clear, by transmitted light. Its consistence is about that of honey, and its sp. gr. 0.900; but this, as well as its consistence, varies.

From the property which it possesses of dissolving caoutchouc, and its general resemblance to Barbadoes tar, I expected to obtain naphtha from it by distillation, which, by being afforded at a reduced price, might prove of considerable utility in the arts. The article procured in this way, is, however, possessed of several peculiar properties.

It is transparent, colourless, and has the penetrating odour of seneca oil. Specific gravity at 60° Fahr. 0.800.

It is of an oily consistence, but is not inflammable unless very highly heated, though, like the fixed oils, it sustains the combustion of cotton, &c. The flame is then white.

It is perfectly soluble in ether and oil of turpentine, but insoluble in alcohol, ammoniated alcohol or water. Upon being agitated with water of ammonia, the mixture became milky; but after a short time the oil rose to the top, retaining a saponaceous appearance. By the addition of alcohol to the ethereal solution, the oil was separated and rose to the top.

It does not change the colour either of turmeric or litmus paper. As a solvent for caoutchouc, I found that five grains of the latter will make a thick varnish with 3 ij. of the oil. The difficulty with which the oil is volatilized will be a barrier to its utility. Its boiling point is considerably above 212°, and my friend J. Carter, who distilled it for me, thinks it between 300° and 400°.

From the above account, it will be perceived, that this substance differs materially from any described by chemical writers. Naphtha, which it most resembles, boils at 186° Fahr. is readily inflamed by the approach of a lighted taper, and is soluble in alcohol.

Selected Articles.

Observations on Sarsaparilla and its preparations, with incidental remarks on certain other remedial agents in the cure of obstinate chronical disorders. By John Hancock, M.D. Fellow of the Medico-Botanical Society, Vice President of the Philosophical Society of British Guiana, Corresponding Member of the Zoological Society, &c.

[Concluded from page 304, Vol. I.]

The activity of sarsa as a medicine, seems to depend on a kind of narcotic quality, affecting the tongue and fauces with more or less of a nauseous acrimony,—the degree or intensity of which, affords the best indication of the strength and value of the drug. Its effects on one patient, an African, were certainly those of a narcotic, agreeably to the best definition of this term. It was given him in a large dose, the infusion from 4 oz. of Rio Negro sarsa. It caused nausea and great prostration of strength, a degree of torpor which induced him to lie upon the ground with unwillingness to move or to get up. He said that it made him "sick as death, and broke all his bones." There was scarcely any alteration in the pulse, unless it were a little retarded.

Whatever restorative and aphrodisiac virtues may have been by the ancients attributed to the Ophrys *Satyrion*, or the different Orchideæ, it appears to me, that the sarsa is the only medicinal agent justly entitled to the character of a direct restorative. This property, at the same time, seems to be totally unconnected with, or independent of, its farina or amylaceous

principle, since it is found to produce the same restorative effects, not only when prepared by an aqueous menstruum, but also in a saturated alcoholic tincture, which we know could not take up those amylaceous or simply nutritive particles.

This is one of the most remarkable effects of the genuine sarsa, and tends clearly to exemplify its eminently salutary properties, namely, the augmentation of flesh, and melioration of the habit, so frequently observable in patients who have taken it for some time. It was noticed by many of the planters of Demerara, as well as by eminent medical practitioners, that not only did sores heal up, and swellings of the joints subside, on the use of the sarsa*, but that the patients acquired a plumpness, smoothness of the skin, and a degree of activity unknown before.

Whatever be its mode of action, its advantages will doubtless be found very great in the treatment of phthisis and scrofula, and especially in correcting a constitutional diathesis tending to those disorders.

It is esteemed by the colonial Spaniards as a remedy for every stage of syphilis. When they go under a course of this remedy, they drink barley water, vegetable acids, and cooling articles, to counteract the heating effects of the sarsa, for they consider it very heating. Perhaps they should ascribe this effect more to the vinous menstruum which they employ.

Much has been said by different writers regarding the *specific* powers, so termed, of sarsaparilla, as a remedy in lues venerea. Although well convinced of the great efficacy of the genuine sarsa, under proper regimen, in the various stages of lues, I consider it no specific; and it is not particularly as an antivenereal remedy that I would insist on its value, but as a

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* It was proved by numerous examples, that the sarsa was the only efficient article in the preparation, and equally successful by itself, whilst the other woods, &c. usually joined with it, were productive of little or no perceptible effects on the patient or the disease. The bark of guaiacum, however, was an exception; but not being an article pertaining to commerce or found in the shops, it was seldom obtainable. Certain native plants were also found exceedingly useful in healing ulcers, and as general alteratives; but these are scarcely relevant here, and are intended to form the subject of a separate paper.

general corrective and sanative agent in scrofulous swellings, ulceration, and lesions of various kinds, and especially in general marasmus, cachexia, debilitated and emaciated habits, and in disorders arising from the abuse of mercury.

Those narrow views and vain discussions about the specific action of sarsa in syphilis, have had the effect of keeping down its character, as a great and extensively useful remedy—a character which it certainly deserves. It is to the want of a proper regimen under its use, to the introduction of spurious kinds, and to faulty modes of preparing it, (by long boiling especially), that we are to attribute the frequent failures which many complain of, and for which it is even totally neglected by some practitioners.

The disease, however, which in the Orinoko and Venezuela, most frequently demands the employment of this invaluable alterative, is a species of rheumatism, which commonly follows gonorrhœa, making its attack soon after the discharge has been suddenly stopped, and the patient has been exposed to cold and moisture.

This species of rheumatism, from suppressed gonorrhœa, is so common an occurrence in Venezuela, that it usually takes the name of *galico*, (*i. e.* venereal); and as most rheumatic affections are there referred to this cause, we rarely hear it spoken of under any other title.

The true gonorrhœal rheumatism, however, makes its attack upon the muscles, the ligaments, and even the periosteum of the bones, soon after the discharge disappears. The joints are rendered immovable; all the limbs, the spine, hips, and shoulders, suffer excruciating pain; after a time, these symptoms are followed by *tophi* upon the tibia, os frontis and bones of the fore arm, and the patient, if not timely relieved, becomes quite crippled and emaciated.

Whatever obloquy may arise from an avowal of our own misfortunes, the paramount objects of truth and candour compel me to say, that such as just described was *my own* case during several months of the year 1814; and that, after a full, but ineffectual trial of mercury, and the usual European reme-

dies, I was entirely restored to health, by taking a single *botejuela* or small jug of the *Jarave del Rey*.

Having been long a convert to some of the exploded or unfashionable doctrines of the humoral pathology, it may readily be believed, that my faith was not diminished by considering the striking translations of disease, from one part to another, so apparent in the foregoing, and in numerous other cases equally convincing.

They also satisfy me, that, in certain cases at least, and these more frequent than is commonly imagined, secondary symptoms follow gonorrhœa as well as syphilis; and, when added to the observations of the army surgeons, (as to gonorrhœa producing chancre, and chancre gonorrhœa), they tend to establish the identity of these diseases.

The Spaniards, I may observe, by the term *reumatismo*, seem to mean nothing more than a flow or prevalence of acrimonious humours in the body,—the same as appears to have been understood by the Greeks in their ῥευματιζω or rhĕumatizō,—afflicted with humours—"rheumatismes Græci fluxiones vocant."—*Plin.*

There is a scrofuloid species of ulcer which more frequently infests the negroes; appearing in different parts of the body, but more especially about the lower extremities, arising with a whitish head, remaining stationary for a long time, and when opened, mostly found to contain a curdy matter. In its rise, progress, and structure, it has a close analogy with tubercles of the lungs. It is of a most intractable nature; and usually requires, as a preliminary, the application of a strong escharotic. There are varieties of this ulcer; some of which, on being opened, show plainly the hidatid form, or half-organized structure; in different stages, *steatomatous*, *curdy*, *purulent*, &c.: they are encysted, and are doubtless animalcules. In their more perfect state, plano-convex, or shape of a coffee seed, marked with a sort of umbilicus, or black dot, on the flat side. Some of the old women in Demerara show a surprising degree of patience in picking out these troublesome subjects, to which they give the name of tetter ring-worms.

Mercurial salivations may cause these ulcerous tumours or tubercles to heal, but they soon break out again, without the timely use of sarsa, which is almost the only remedy we know of that will heal them with any degree of permanence; and of this we usually find a long course is required. The nitric acid and antimonials were found greatly to contribute to the sanative process; and not only in this species, but in most other inveterate ulcerations so common in the colonies.

It was in the course of my practice in those anomalous and inveterate complaints, that I perceived the absolute necessity of attending to the doses of medicines in a degree too rarely noticed and too little insisted on by medical writers. I especially allude to the necessity of watching the results and augmenting the doses of the remedies till some sensible effects are produced on the system. When that is sufficiently apparent, the remedy, whether it cause inconvenience to the patient or not, is of course to be discontinued for a time,—a week or two, and sometimes longer, according to the intensity of its action on the patient. When its apparent effects have subsided, we may again commence its use in a small dose, and augment it gradually as before.

By reflecting on the controul thus acquired over external ulceration, it naturally occurred to me, that the same method ought to have its influence in some cases of pulmonary lesions with severe cough and purulent expectoration, as also in ulceration of the bladder and other viscera.

It is true I had but few opportunities of repeating experiments proper for illustrating this important point, having left the colony not long after I had formed the plan here alluded to. My experience in this, however, was such as to afford me the most confident hope of its ultimate success in phthisis and internal ulceration.

In other cases likewise of obstinate chronic and cutaneous disorders, it is not unfrequently found requisite, especially amongst the negroes, to employ various additional remedies. A preliminary light course of mercury and antimony, nitric acid, iodine, sulphureous fumigation, a grain of opium at night, and the vapour bath occasionally, are amongst the best auxilia-

ries. The disorders here alluded to are, for the most part, of that anomalous description, which it would be impossible to characterize by any definite name as being chiefly complications of yaws, leprosy, syphilis, and scrofula, developed in various lesions or affections of the skin, joints, ligaments, and glandular parts, as cutaneous eruptions, swellings, ulcers, &c. in different parts of the body*.

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* Amongst the chief exciting causes of such affections, we should mention exposures to vicissitudes of weather, in the rainy season especially, and defective nourishment. The latter cause, however, is not so frequent amongst the slaves, as they are usually well fed by their masters, whose interest, humanity apart, is too deeply involved to allow this point to be neglected; and, in case of deficiency, it would be speedily corrected by the interference of the law, which, in one of the richest soils conceivable, renders it compulsory on the planter to keep in proper cultivation, for every five slaves an acre of land, which, admitting the statement of Baron Humboldt to be correct, would be a supply for many times that number of people. See his *History of New Spain, Vol. II. p.* 374, where it is said, that "the produce of the banana is to that of wheat as 133 to 1, and to that of potatoes as 44 to one."

Without recurring to any exaggerated reports, and although never an advocate for slavery, I may here take occasion to remark, that the present condition of the slaves in the British *Continental* colonies (I do not allude to the Islands) may, in point of comfort and plentiful supply of food, be said to be quite enviable compared with that of the labouring classes in this country. This is a truth which ought in fairness to be stated, but it is not intended as an apology for slavery.

And this advertence, which may seem irrelevant here, I have introduced, because, upon speaking on these subjects in London, it has been more than once suggested to me, as a query, whether the negroes were not *half starved* in the colonies. A person of very moderate capacity like myself, after a residence of twenty-five years in the colonies, ought to be able to form a tolerably correct opinion on the subject.

The plantain is considered the staple and indispensable article of food in Guiana; but, independent of this, the slaves are generally allowed as much land as they choose to cultivate; consequently, those who are inclined to a little industry can procure, for their own use and for market, an abundance of yams, maize, sweet potatoes, and other nutritive vegetables. They are frequently found, however, to be very indifferent to this privilege, and, therefore, the supply of those articles, in order to ensure its being more constant and regular for their families, is, on certain estates, under the express direction of the proprietor or manager. I mention this beneficial practice, not as one universally followed, but as deserving imitation by all; for it is well known that a diversity of similar alimentary substances contribute much more strength and vigour than can be derived from any one taken singly, as, in respect to medicines and spices, their powers are greatly enhanced by combination.

I ought to observe here, that from the few trials I made with iodine, it appeared to be a very useful auxiliary in leprosy, and in those scrofuloid ulcers here spoken of, as also in swellings of the knee joint, common in Guiana, being a species of hydarthrus, or white swelling, arising as the results of cold and rheumatism, in strumous habits especially*. In lepra, the use of iodine was suggested, by the presence of those glandular lumps or tubercles, which, in all advanced cases, might be felt under the skin, especially in the legs and thighs of lepers, and withal greatly disfiguring the face. This remedy was exhibited in small doses, cautiously augmented, in the form of tincture, in the manner advised by *Coindet*, in somewhat analogous disorders of the glandular system; and also, as a deobstruent tonic, in cachexia or anasarcous habits, depending on glandular visceral obstructions.

The advantages gained by these remedies were often very great; they seemed to impart to the system a susceptibility to the action of sarsaparilla, and the bark of guaiacum. In one case of chronic hepatitis, the symptoms were quite removed by the use of iodine and sarsa, or *on* their use, for it is not

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* When the joint was found much enlarged, the contained fluid was let out with a common lancet. This fluid was usually of a slimy or gelatinous nature, not unfrequently similar in appearance to that of the bursæ mucosæ in a healthy state, and more rarely sanious or purulent. I never observed any ill effects from these openings, or from the ingress of air which has been so much dreaded: indeed, the neglect of it must inevitably cause a stiff joint, or render amputation necessary. I may possibly labour under some erroneous impression, but I have long regarded that as one of the most preposterous of pathological dogmas which proscribes the timely opening of these tumours. It has probably arisen from several different tumours of the knee joint being confounded under the same name or names. Instead of discharging their contents by one of the simplest and safest operations, it is usually enjoined, that they be allowed to break of themselves: the consequence is, that the matter or fluid being pent up for a long time, makes its way in different directions under the muscular expansions, forming sinuses, corroding the capsular ligament and the ends of the bones, and, at the least, leaving the patient with an incurable anchylosis. It is, in general, only necessary to let out the fluid and bind the knee moderately tight with an elastic bandage. In cases where adhesion has not followed, and the collection and swelling has returned, I have injected into the sac a very dilute mixture of honey and water, and again pressed it out as soon as a little pain was excited, and which, with the internal remedies just mentioned, have effected the cure.

always easy, when a recovery takes place, to decide how much is respectively due to nature, and how much to the remedy administered. Another instance may be adduced, in which an inveterate cough attended, and which gave reason to suspect the existence of tubercles in the lungs: the patient recovered after a six weeks' course of iodine and sarsa. In some other cases of this kind also, the result seemed to afford a hope, that the action of iodine, may equally contribute towards resolving the pulmonary tubercle, as well as those seated more superficially.

The genuine sarsa of the Rio Negro proves also a very potent antihydropic, especially in cases of great debility, and where dropsy arises in emaciated habits. The diuretic power of the carony bark has been already alluded to, (see p. 26 and 27). It is, perhaps, partly owing to this power, and partly to its tonic and bracing effects, that this bark has been found so useful in dropsies, in which it has often proved a decisive remedy; and, at other times, a powerful auxiliary, along with a gentle course of mercury and squills, with the use of taraxacum, and a grain of opium at night, and once or twice a week a dose of the wild elaterium, or bitter cucumber, MOMORDICA *operculata**, in a solution of tartrate of potash. This is briefly the plan which, in general, I have found most successful in dropsies of various kinds, whether general or partial.

I must here observe, that in recent dropsies which come on suddenly from colds and obstructions, we find depletion to be of the first importance, the *sine qua non* indeed. In this species of dropsy, the blood is often observed to be sizy or quite gelatinous. The remedies just mentioned usually produce a degree of tone and excitement in the system, such indeed, at times, as to indicate bleeding. This condition, arising in adynamical dropsies, in chachectic and leuco-phlegmatic habits, is ever to be regarded as the most favourable; and, under such circumstances too, moderate depletion has been found most

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* This plant grows abundantly on the coast of Essequebo, especially at Cape Batave, the property of Mr Gilgeous, and at Plantation Richmond, belonging to Mr Bean.

essentially to promote the curative process, and to contribute to a happy recovery. The diseased action seems by these measures to be subverted, the dormant energies of the vital or nervous system to be roused into action; the vessels to recover their wonted power of contracting upon the sluggish fluids, of propelling them through the veins and capillaries, and of restoring the healthy balance throughout all the corporeal functions.

The results of such cases tend to convince us, that remedial agents which we are prone to regard as the most opposite and incompatible, not unfrequently prove the only curative ones in many of the most untoward disorders, and those too, both acute and chronic, for similar conclusions may likewise be drawn from those methods which have been found to be the most successful in cases of yellow fever.

It is well known there are a great variety of exceedingly useful remedies amongst the indigenous vegetables in England, but these, in general, appear to be too much neglected by the members of the faculty, who, however eminent in other respects for exalted talents and profound medical skill, seem, on the whole, to evince rather too exclusive a preference to the chemical or chemico-mineral remedies at present in vogue. Amongst those native plants I should venture to propose the taraxacum, or dandelion, as a valuable addition to this compound infusion of sarsaparilla (p. 68). This plant, the taraxacum, is acknowledged to be a useful remedy in certain obstructions and disorders of the liver, by some eminent English physicians; and on the continent, in Germany especially, it is employed with the most decided advantage as an alterative in cutaneous affections, and many very obstinate chronic maladies, as I have been assured by earl Stanhope, the distinguished president of the Medico-Botanical Society, who, to the more renowned and splendid talents of a statesman, as a peer of the realm, unites a love of all the sciences conducive to human happiness; attaching however a more particular interest to the advancement of medical botany, on which subject he has manifested the most correct views and soundest intelligence: he is moreover sensibly impressed with a conviction that,

in the prevalent affectation for mere descriptive botany, its more important and scientific objects have been nearly overlooked and disregarded, viz. the application of its principles to useful purposes in medicine, in the arts, and to domestic comforts and economy.

His lordship being absent (on the continent) I have used this reference without permission, persuaded, however, that he would not refuse his name to a discussion which involves the public good, and the objects of the Medico-Botanical Society.

Memoir upon Fecula. By M. Guibourt.

[Concluded from Page 214, Vol. I.]

Fecula from Wheat.

Examined by the microscope, this fecula appears in spherical globules of a very variable size, but always of a smaller volume than that obtained from the potato.

The hardness and adhesiveness of the starch of commerce is owing to the escape of the gelatinous matter when bruised in a mill, or by the heat of fermentation; whilst that of the potato remains pulverulent.

M. Raspail observes, it is therefore preferable to use this soluble part of wheat fecula cold, to stiffen linen, but that in impregnating the fabric with the potato starch, and retaining it sufficiently moist, it has been proved that the head of the iron passing over it, whilst it assists the solution of its soluble matter, will absolutely produce the same effect as in the former instance.

It is not, however, to this application that M. Guibourt believes the utility of fecula may be limited, but that the facility of effecting a solution without heat, by simple bruising it, will give rise to its employment in place of gum, in many of the arts where there is now a great consumption of that exotic sub-

stance; already have attempts been made thus to use it by torrefaction, but the colour and odour imparted to the product by this process would injure it in most cases for such an application.

Arrow Root.

The arrow root, fecula from the *maranta indica*, is in grains of a larger size than that of wheat, more shining, and entirely transparent when exhibited through a magnifying glass. It is its great transparency which diminishes the whiteness of its powder. Examined through a microscope, the grains appear spherical, oval, and sometimes triangular, like those of the fecula of the potato; but they are always less in size. Both communicate to boiling water less consistence than starch; which may arise either from their containing more water, (a fact contested by M. Theodore de Saussure, with regard to that of the potato), or they may contain a greater proportion of soluble fecula, which last circumstance is the probable cause.

Moussache and Tapioca.

These two feculæ are extracted from the root of the *jatropha manihot*, and differ only in the manner in which they are dried. The first in the open air, and the second upon heated plates of iron, which give the form of irregular lumps, composed of agglomerated grains of fecula. The moussache was but little known in France, until it was recently sent from Martinique, as a substitute for Jamaica arrow root; and it appears that there has already been a large quantity of it consumed under the latter name. It is difficult to distinguish it by the eye; but to the microscope it presents a granular form, spherical, much smaller than the arrow root, and less also than the large grains of starch, and *an uniformity of size* that is remarkable. This last character will prevent the moussache from being confounded with any other fecula. Tapioca is in very hard and slightly elastic lumps, which appear through a magnifying glass, formed of spherical agglomerations of transparent grains of fecula. These grains have been in great part burst open by heat.

Tapioca, swollen and diluted in water, furnishes a solution of fecula that changes to a deep blue by the addition of iodine.

It is not entirely soluble in cold water, as has been asserted by one of my predecessors; with boiling water it forms a peculiarly transparent and viscous starch; submitted to a protracted ebullition in a large quantity of water, it leaves an insoluble residue, that readily precipitates. This residuum, mixed in water and coloured by iodine, to render it more distinct to the microscope, presents a mucous flocculent form, which bears no resemblance to the primitive teguments, and which floats in the midst of a colourless liquid.

Sago.

Sago is the fecula of the *sagus farinaria.* Such as we receive is in small rounded grains, very hard, and of a dull white or reddish tint, demi-transparent.

This fecula appears so very dry, that one would suppose it ligneous, if the microscope did not show that it is entirely composed of amylaceous grains, like those of the potato, distinct, but oftentimes matted or variously pressed together. Scarcely any of it is soluble in cold water, and iodine imparts to its filtered solution only a violet tint. Heat bursts the grains, and leaves the teguments exposed, which are of all others the most insoluble, and longest resist the action of boiling water; for however protracted the ebullition, or however great the quantity of water, there still remains an insoluble residuum, easily separated by repose; and which, when tinged with iodine, and examined through a microscope, appears to have preserved the isolated form of the grains of fecula. It is generally admitted that sago owes its reddish shade of colour to a slight torrefaction; but the entireness of the grains show that the heat employed must have been trifling; and M. Guibourt is rather disposed to attribute this partial coloration to a foreign principle, not entirely washed from it, and which, contributing to unite the grains of fecula, is the cause of their semi-transparency.

Salop.

This is not the proper place to describe salop, which is the root of the *orchis*, steeped in boiling water and dried, and not a fecula. Besides, this substance, such as it is found in commerce, has been thoroughly examined and described in the memoir of M. Caventou, (Ann. Chim. Phys. xxxi. 345). M. Guibourt believes, however, that to obtain a just idea of its composition, one ought to examine the recent or dried root, previous to immersion in boiling water; for this operation, by bursting the grains of starch, impregnates with it the texture of the bulb, or the substance analogous to bassorine, which constitutes the greater part of this root, and communicates to them the property of tinging blue by the addition of iodine, in the same manner as starch; which has induced the belief that salop is much more amylaceous, than it really is.

Note upon Amadine.

M. Theodore de Saussure has given this name to one of the products, from the spontaneous alteration that occurs in starch. M. Raspail believes, that this is nothing else than the teguments which have escaped decomposition. And M. Caventou's *amadine* corresponds with our soluble fecula.

These apparent differences of opinion, M. Guibourt thinks may be easily reconciled.

He concludes with stating:

1. That starch contains the teguments of fecula, simply swollen, and not dissolved, since it is a necessary condition of its consistence.

2. That these teguments which are insoluble in cold water, when once partially dissolved by ebullition, furnish a liquor, which offers all the characteristics of soluble fecula, properties which are exactly those of the amadine of M. de Saussure.

He is convinced therefore with M. Raspail, that M. de Saussure has extracted this substance from a part of the teguments which has escaped spontaneous decomposition; and with M. Caventou, that this amadine is nothing more than soluble fecula. C. E.

Observations on the Orayuri or Angustura Bark Tree. By John Hancock, M.D. Fellow of the Medico-Botanical Society. Read July the 11th,* 1828.

The powerful medicinal properties of the Angustura Bark, and its great efficacy in many cases, acknowledged by all the learned practitioners of Europe for more than thirty years, will, I trust, prove a sufficient apology for my drawing the attention of the Medico-Botanical Society to the Tree from which this drug is obtained.

Having travelled repeatedly, and resided during several months (particularly during August and September 1816) in the missions of Carony, and sketched a map of the district, I had an opportunity of seeing many thousands of the Bark Trees, and of examining numerous specimens on the spot, deeming it, as a medical practitioner, a duty incumbent on me to improve the opportunity which then offered, of making myself thoroughly acquainted with its botanical characters, well knowing how imperfectly they had been described in the different works then extant. In the course of my observations, I remarked that it would have been impossible for any botanist, however expert, to recognize the Angustura Bark Tree with the assistance of any one of those works, into which its descriptions have all been transcribed from that of Baron Alexander de Humboldt and his scientific coadjutor, M. Aimé Bonpland; and I have no doubt that those learned gentlemen themselves will confess, should these pages ever reach them, that they have fallen into an error by trusting too much to the testimony of others. I was informed by MM. Ravigo and Jose Terreas, with whom the travellers lodged at Angustura, that they did not visit the missions of Carony, but sent an Indian, who returned with a sample (*muestra*) of the leaves, but, much to their disappointment, without flowers. It is therefore probable that their descriptions refer chiefly to specimens which

* The Society's Gold Medal for 1829 was awarded to the author for this paper.

they observed in the province of Cumana, where *a species* of the Genus to which the Angustura Bark Tree appertains may grow to the size mentioned.

I shall now endeavour to lay before the Society, in as concise a manner as possible, the results of my observations on the external appearance of the plant; the prominent differences between my description and that of Humboldt and Bonpland in their splendid work on the Æquinoxial plants; and, lastly, the medicinal properties I have noticed in the Bark, together with the manner in which I have administered it.

I was never enabled to learn from what source the illustrious travellers above mentioned derived the name *Cuspare* for the Carony Bark Tree. I resided for three years and a half at St Thomas de Angustura in Spanish Guiana, whence I made several excursions amongst the missions of Carony, and the tracts inhabited by Indian tribes between them and the mountains of Parime, but never once heard the term used; the vernacular name among the Aborigines of this part of Guiana (the tribe called Guyanos, who had long been subject to the dominion of the Catalonian Capuchin Friars) being *Orayuri;* and among the Spaniards and Creoles, it was known by the name of *Cascarilla* or *Quina de Carony*. The *Cuspa*, however, which is known as a tree of Cumana, has a bark that is bitter, and of a yellow tint; and although it is much lighter, nauseous to the taste, and altogether different from the Orayuri, it is fancied by the inhabitants of Cumana to be allied to the Carony Bark Tree; at the same time they acknowledge its virtues to be much inferior. They usually judge of plants only from some similitude in the bark, leaves, fruit, &c. without regarding the flowers. So, also, in Demerara, some have identified the Carony Bark Tree with the *Yaroury* or Paddle Wood, than which, scarcely any two trees differ more, with the exception of a likeness in their barks, both having a yellowish colour and bitterish taste.

It is not in Carony or Guiana then, but doubtless in Cumana, that we are to seek the derivation of the term *Cuspare*, an easy transition from the *Caspa* of the natives, which is pro-

bably of Tamanac origin. I know their great fertility of invention when in want of a name for any thing met with in the forest; though I have observed that, among some of the Indian tribes, we find, notwithstanding the numerous confusions they make in many instances, a remarkable degree of intelligence and aptitude in naming trees and plants according to their natural affinities, especially amongst the Arowak tribes: *Wayure* is equivalent to our Orchideæ; *Sirua* to the Laurineæ, and hence come *Sirubali* (Ocotea *Cymbarum*), *Sirudani*, &c. by adding various adjective terms indicative of the different species.

As to the Cuspa Tree, with which the Orayuri may have been thus mistaken, I cannot here speak with sufficient accuracy; for having sent from Demerara in 1825, requesting complete specimens, bark and all, of the Cuspa Tree of Cumana, I received the following year a few pieces of the bark, with the important information, or what, no doubt, was thought important, that the leaves and flowers were not used *"como remedios."*

The Angustura Bark Tree grows in abundance on the mountains in the neighbourhood of St Joaquin de Carony, situated between the 7th and 8th degrees of northern latitude. It is also well known in the missions of Tumeremo, Uri, Alta Gracia, and Cupapui, (as correctly mentioned by Humboldt), which are the southern and back missions of the Orinoko, at a distance of upwards of 200 miles from the sea. It lines the road side, in many places, between the missions of St Antoni and Villa Upatu. It delights in a rich soil, and flourishes at the height of between 600 and 1000 feet above the level of the sea.

It seldom or never exceeds the altitude of 20 feet, the usual medium being about 12 or 15 feet. The diameter of the trunk, which is tolerably erect, is from 3 to 5 inches.

Branches scattered over the whole tree without much order.

Bark, smooth and externally gray.

Leaves, placed, for the most part, alternately on the branches, composed of three folioles, supported on a common petiole of nearly the same length as the leaflets, slightly channelled on

the interior surface. Leaflets oblong, in general from 6 to 10 inches in length, and 2 to 4 in breadth, the centre one being longer than the lateral ones, pointed at both extremities, and connected at the base by very short leaf stalks with the common petiole. They are very smooth and glossy, of a vivid green, and yield, when recently broken from the tree, a strong odour, greatly resembling that of Tobacco, from which circumstance the term *Orayuri* seems derived, as the word *Yuri* or *Yourie* signifies Tobacco in the Arowak dialect. Some of the leaflets are marked with small, whitish, round spots.

Flowers, numerous, borne towards the extreme part of long spikes or racemes, which are both terminal and axillary. Bracteæ, lanceolate, acute, in pairs. The flowers also have a peculiar, not the most pleasant, odour.

Calyx, monopetalous, bell-shaped, five cleft, hairy, rough, inferior, and persistent ; green, about one-fourth of the length of the Corolla.

Corolla, somewhat curved prior to expansion, tubular, bursting from the centre ; nearly an inch long; tomentose both inside and out; composed of five unequal petals, two of them being about 1-9th longer and larger than the others, so united at the base as to appear inseparable*, and indeed never separating ; these petals are reflex, oblong, obtuse, fixed in the receptacle, and, when faded, breaking off round the germ, leaving a protecting border besides the receptacle.

Nectaria, if they may be called so, five linear leaflets borne at the mouth of the tube, half the length of the petals, each bearing at its summit a very minute, round, pellucid glandule, filled with a fluid.

Stamina, two. Before the expansion of the flower they are found lying towards the inner or inflected side of the corolla, the anthers in the groove of the two longer petals, the tips of the three shorter ones being incurved over them as for

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* I had previously described the Corolla as monopetalous, and I still consider it to be so, although, in submission to higher authorities, I have in the text spoken of it as a pentapetolus Corolla.

protection. Filaments flat, inserted into the two longer petals at the mouth of the tube, considerably shorter than the nectaria. Anthers large, linear, erect, longer than the filaments, four channelled, two celled.

Pistillum, consists of a five-lobed depressed germ, immersed within a coriaceous receptacle ; a simple, filiform style, hairy at the middle, longer than the tube, and a capitate entire stigma.

Pericarp, consists of 5 bivalve capsules, of which 2 or 3 are commonly abortive, resembling short legumes, gibbous. When in the embryo state they are smooth, tender, and semi-pellucid, and when approaching maturity, they gradually acquire a villous rough coat.

Seeds, two to a capsule ; one of them often abortive, round, black, the size of a small pea, fastened near together by minute pedicles within a chaffy envelope, which is again surrounded by a strong elastic perisperm or arillus, which is horny, bivalve, bursting with violence, and dispersing the seeds it contains to a considerable distance.

Of the *receptacle*, or that part which may be designated thus: In the early stage of the flower, when the corolla has reached the length of 3 or 4 lines, on detaching it from the calyx the 5 little ovaries may be observed standing naked upon the receptacle, which is then merely such. It, however, gradually grows up into a rim or circle around the ovaries in such a manner, indeed, as entirely to cover and envelope them in a tough leathery coat or hood. By the time the flower is ready to open, and at the falling off of the Corolla, it entirely conceals them. When they commence to emerge, this receptacle dilates, thickens, and remains a supporting base to the then super-imposed capsules. When the flower is fully opened, the receptacle is obscurely 8 or 10 notched. May not these different evolutions be compared to the metamorphoses of insects, or rather to the changes which take place between the chorion and embryo in animals, during the earlier periods of gestation?

The Angustura Bark Tree flowers in vast profusion during

the months of August and September, when its elegant, white blossoms add greatly to the beauty of the scenery. Its seeds ripen in October and November.

I shall now proceed to notice the differences existing between the foregoing description and those of anterior and even subsequent writers, such as:—Willdenow, who erroneously formed a new Genus, which he called BONPLANDIA, on the plant sent him by Baron Humboldt as the one in question, notwithstanding there already existed a Genus of that name, and although the Angustura Bark Tree most obviously belonged to the Genus GALIPEA of Aublet* :—Humboldt, and subsequently

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* In the above opinion, formed in the year 1816, I am confirmed by the following extract from the *Prodromus Systematis Naturalis Regni Vegetabilis* of De Candolle, (vol. i. p. 730,) a work which I have been enabled to consult only since my recent return to England, and to which, after I had nearly completed this paper from the numerous observations I had made 12 years ago, my attention was directed by Mr Yosy, Sec. Med. Bot. Soc., who, having mentioned the subject to Mr David Don, the learned Librarian of the Linnæan Society, was by him informed of the improved arrangement made by De Candolle.

"DICOTYLEDONES seu EXOGENÆ.

"RUTACEÆ.

"Trib. II. Cuspariæ. D.C.

"XXIV. MONNIERIA.

"XXV. TICOREA.

"XXVI. GALIPEA. *Aubl. Guian.* 2. p. 662. *St. Hil. Bull. Philom.* 1823, p. 131. Galipea et Cusparia, *D. C. Mem. Mus.* 9, 142 et 148. Cusparia, *Humb.* Bonplandia, *Willd. non Cav.* Angustura, *Rœm. et Shcultz.* Conchocarpus, *Mik,* Obentonia, *Vel.*

"Calyx brevis quinquedentatus. Petala quinque in corollam hypocrateriformen coalita, seu valde approximata, tubo brevi pentagono, lobis patentibus acutis. Stamina 4-7 hypogyna, petalis subadhærentia, inæqualia, interdum omnia fertilia, sæpius 2 majora antherifera, 2-5 breviora sterilia. Nect. cupuliforme. Styli 5 in unicum mox coaliti et stigma 4-5 sulcum constituentes. Carpella 5 aut abortu pauciora biovulata obtusa cocculiformia sessilia, endocarpio separabili. Semina abortu solitaria. Cotyledones magnæ corrugatæ biauriculatæ. Frutices glabri; folia alterna simplicia aut plurifoliolata, foliolis oblongis acuminatis; pedunculi axillares multiflori.

* *Foliis compositis.*

"1. G. *trifoliata.* (Aubl.)

"2. G. *Ossana.*

"3. G. *Lasiostemon.*

"4. G. *Cusparia* (St. Hil. MSS.) foliis 3 foliolatis, racemis pedunculatis subterminalibus, calyce 5 dentato, staminibus sterilibus 3. Hab. in Amer. merid.

Humboldt and Bonpland, who from the nomenclature adopted by the former in his *Tableau Géographique des Plantes*, passed over to that of Willdenow; and Messrs Rœmer and Schultz in their *Systema Vegetabilium*, vol. iv. p. 188, who have described the Genus under the name of ANGUSTURA, thereby giving an improper example to future botanists, as the nomenclature of plants should never be derived from the countries or particular places they inhabit.

And, *first*. We are informed in the *Plantæ Æquinoctiales*, by Rœmer and Schultz, and by Dr Thompson in his excellent London Dispensatory (a work which, from its more general circulation amongst medical men, and even amongst the public generally, ought above all others to be correct), that the tree yielding the bark in question, is a majestic forest tree from 60 to 80 feet high. As it would appear that M. de Humboldt never saw the Bark Tree at Carony, it is more than probable that the tree which he saw growing at Santa Fé de Cumana, and New Barcelona in New Andalusia, and which he considered to be the same as the one of which he had obtained the foliage, whilst residing at Angustura, is a distinct species of the same Genus.

Secondly. Not only does a similar variation of size exist between the leaves of the GALIPEA under consideration, and those of BONPLANDIA *trifoliata*, but the proportion in the length of the petiole, when compared to that of the leaflets,

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Cusparia febrifuga, *Humb. tabl. geogr.* Bonplandia trifoliata, *Willd. act. acad. berol.* 1802, *p.* 24. *Humb. et Bonpl. pl. eq.* 2, *p.* 59, *t.* 57. *Kunth nov. Gen. am.* 6, *p.* 8. Angustura Cuspare, *Rœm. and Schult syst.* 4, *p.* 183. Cortex Angusturæ, *Offic.*

"5. G. *heterophylla*, &c. &c."

I have to acknowledge my obligation for some of the hints above given, with regard to nomenclature, to De Candolle's paper on the Cuspariæ in the Mem. Mus. 9, p. 148, and to the learned work of Messrs Rœmer and Schultz.

It might be here remarked that *trifoliata* seems not to be a very appropriate specific distinction, since there are no less than four species of GALIPEA already known as *three-leaved*. Besides which, the *three-leaved* SCIURIS or RAPUTIA of Aublet, of which I possess very perfect specimens, appears also to be a true species of this Genus. Aublet neglected to give a precise description of the fruit, which is similar in structure to that of Orayuri. I observe that M. de Candolle has, with some hesitation, still given it a distinct Genus.

is totally different, the leaves of the B. being stated to be 2 feet long, and the petiole one or nearly so.

Thirdly. The leaves of Humboldt's tree are stated to exhale, when fresh, an agreeable odour, whereas those of *Orayuri*, when fresh gathered, yield an odour resembling that of tobacco, which, however tastes, in the general acceptation of the word, may differ, can scarcely be said to be agreeable.

Fourthly. The corolla is represented in the *Pl. Æquin.* as regular; and by Mr Kunth one petal is said to differ from the rest; whereas the corolla is irregular, there being two longer and three shorter petals.

Fifthly. The appendages which I had considered as nectaria, by others taken for abortive stamina, are invariably five in number, though stated by some as three (Rœmer), and by others as four (Kunth).

Sixthly. The stamina are said by Kunth to be monadelphous, whereas they are distinctly (separately) inserted in the two longer petals of the corolla. Their number is also greatly at variance with the truth, the *Plantæ Æquinoctiales* and most other works terming it a Pentandrous Plant. But it may be said that those linear leaflets, which I have considered as nectaria, have been reckoned amongst the stamina as being nearly concentric with them. This, we see, has been done, but it does not clear the difficulty, for these bodies are, in *Orayuri*, invariably *five* in number, and, having no anthers, ought not to be confounded with the stamina, whilst the proper filaments with large anthers pass at the same time totally unnoticed; but even supposing the numbers to correspond, these linear leaflets could never with propriety be regarded as stamina, as the anther is the essential part, and without the anther there is no stamen. If these are to be taken for stamens, then the plant is heptandrous. In the description given in the *Plantæ Æquinoctiales* there is, moreover, no mention of sterile stamens.

Seventhly. The seeds are represented as being solitary, whereas, though one of them is generally abortive, there are invariably two, or, at least in the case of abortion, the rudiments of a second.

In the *Orayuri,* I can find no trace of the spur at the bottom of the anthers mentioned by Humboldt.

The pistil of BONPLANDIA is said to have 5 stigmata, instead of a simply capitate one.

There are other minor discrepancies in the flower, but the most remarkable appearance in *Orayuri,* and which is not touched upon in the description of BONPLANDIA, is the uncommonly strong and horny arillus in which the seeds are enclosed. This appendage is so elastic that it is difficult to preserve the seeds, the capsule always bursting in the dried specimens. This species of perisperm or seed-envelope, where it obtains, so far from being disregarded, was considered by Linnæus as one of the essential characters of a Genus. Witness DICTAMNUS, DIOSMA, COFFEA, &c., but in none is it so notable as in *Orayuri.*

Though concurring, on the whole, with the lucid arrangement of MM. Auguste de St Hilaire and De Candolle of the Genus GALIPEA, I cannot agree to the specific name bestowed by those eminent botanists on the Angustura Bark Tree, the term *Cusparia,* being, as I have before observed, founded in error. I shall, therefore, agreeably to the suggestion of my friend, Mr J. P. Yosy, one of the Society's Secretaries, propose the name of GALIPEA *officinalis;* with the following specific description:

GALIPEA *officinalis,* foliis 3 foliolatis, racemis pedunculatis axillaribus et terminalibus, calyce 5 dentato, staminibus 2, nectariis 5 (staminibus sterilibus?)

If in the delightful and fruitful country to which this plant is indigenous, the heat is at times oppressive to the inhabitants, engendering malignant fevers, yet this salutary and providential antidote is growing at their doors, and they have acquired a tolerable knowledge of its powers, the mode of employment in that part being to drink a warm Infusion in order to induce sweat and diuresis. They often, however, begin with so large a quantity as to evacuate the stomach or the bowels, for it is capable of effecting both, and indeed is often employed for that purpose as well as a febrifuge *(contra-calentura)*, while a

decoction of the leaves is resorted to as a bath in fevers and pains of the limbs, arising from cold or chronic rheumatism.

In the years 1816 and 1817 there prevailed in the district of the Orinoko, and particularly at St Thomas de Angustura, a malignant bilious intermittent fever, which proved fatal to great numbers of the inhabitants as well as to foreigners. In the latter, it assumed the form, in many cases, of true yellow fever, with *vomito prieto.*

I had the appointment of *Medico de Sanidad* in the harbour, which is about 260 miles up the river, and had an opportunity of observing this disease in all its various shapes. I had also the care of the Military Hospital in 1817, during the absence of the garrison-surgeon, Don Pablo Gonzalez, and had seldom less than 60 or 70 patients with fever, dropsy, and dysentery. The number of hydropic patients was almost incredible. It was distressing to see them dying along the streets of Angustura from the effects of fever and want of food, the town being besieged by the patriot forces under General Bolivar.

In March 1817, the mortality increasing, our stock of Cinchona was soon expended, and we had no other resort but to the Quina de Carony, of which there was a large supply in the town. It was prepared nearly as prescribed by those who were there termed *Curiosos*, or the native doctors.

Into a large jug, containing about six gallons, we put one pound of coarsely-powdered bark, with an equal quantity of brown sugar, filled it nearly with boiling water, and added about four ounces of wheaten bread to hasten fermentation. It was then stopped close, placed in the sun, and shaken frequently. As soon as fermentation was well begun, it was considered fit for use, and administered in the quantity of from four to six ounces to the dose, three or four times a day.

The success of this seemingly odd preparation was very remarkable. The irregular paroxysms of fever were suspended on the second or third day after commencing its use. The number of deaths of patients from fever was soon diminished to one-fourth of that which before fell victims to this dreadful scourge; though prior to this time it was gradually on the increase. In the month preceding the adoption of the Cortex

Angusturæ, fifty-three persons died of fever: the month following, there were but fourteen, and several of these were in a dying state when they began to use the Bark.

I, at first, conceived that fermentation might injure the remedy, but had subsequently every reason to suppose, that the evolution of the carbonic acid rendered the remedy more energetic, and more grateful to the palate and the stomach. Besides this, the acetic acid and small portion of Alcohol generated in the fermentation would contribute to extricate more completely the active element of the bark, thus improving the remedy by augmenting the solvent powers of the menstruum.

It was not long before I perceived the efficacy of the fermented infusion in dropsy, for many of the fever patients were hydropic, and it was found that their swellings rapidly diminished on the use of the infusion. This naturally induced me to give the same remedy as a tonic to those patients who were simply dropsical or without fever. Its powers in those proved more striking and decided than any thing I ever witnessed before in medicine. No regular account of these, however, was kept, as it was administered to a great number of patients in and out of the hospital.

In the more severe cases of dysentery, the Dover's powder was given with each draught of the infusion, in doses of from five to ten grains, three or four times a day.

We had thus no reason to regret the exchange we had from necessity made, for the Angustura bark was found to be greatly superior to the Peruvian bark. Though some patients were averse to it at first, they soon requested to have it, when they saw their companions in sickness recovering so fast under its use. I afterwards received a supply of Cinchona from Trinidad, but made no use of it.

I have also witnessed the best effects from this remedy since my return to Demerara, although I could at that time seldom procure it in a fresh state, owing to the long cessation of intercourse with the Orinoko.

The Capuchin Friars of Carony had been in the habit of preparing an Extract from this Bark, from the sale of which

they derived great pecuniary advantages, but from the trials I made with this it seems much inferior to the fresh bark or its recent infusion.

The natives also use the bruised Bark as a means for intoxicating fishes *(Barbasco)*, which affords a very singular coincidence with what is mentioned by Dr Saunders, of the same use being made of the Cinchona Bark by the Peruvian Indians.

I am fully convinced, from ample experience of the virtues of this Bark, that it is one of the most valuable febrifuges we possess, being adapted to the worst and most malignant bilious fevers, while the fevers in which Cinchona is chiefly administered are simple intermittents, for the most part unattended with danger.

May I be allowed to hope that, with the assistance of the above description, the GALIPEA *officinalis* may be found on the higher lands (continuation of the Carony mountains) near the falls of the rivers Demerary and Essequebo, and that the bark may be thence imported in a state much more fit for the London market than it is now to be had, coming as it does through a circuitous route, the length of which cannot but impair its properties.

I have thus endeavoured to lay before the Society the results of my observations, humble as they are, and hope that, though insignificant in themselves, they will lead to future investigations into the medicinal properties of this valuable remedy, which I am fully convinced are not to this time sufficiently known or appreciated.

On some Pharmaceutical Preparations of Iron, and particularly the Tartrates. By Andrew Ure, M.D. F.R.S. &c. &c.

1. Tartaric acid has hardly any action on the red oxide of iron, for though 200 grains of the former dissolved in water,

were digested on a sand bath on 50 grains of the latter, in the form of the rubigo ferri of the shops, it became but faintly coloured in the course of three days, and a very few grains only of the oxide were taken up. The same rust of iron was quite soluble in dilute muriatic acid.

When tartaric acid, in solution, is digested on red oxide of iron, prepared by nitric acid, no apparent combination ensues after many hours, and the re-crystallized acid is nearly colourless.

2. The readiest mode of obtaining a proper red tartrate of iron, is, by mixing the liquid red sulphate with solution of tartrate of potash in equivalent proportions. Sulphate of potash precipitates in a crystalline powder, (the solutions being somewhat concentrated) which may be separated from the blood-red liquid tartrate of iron by filtration. When to this ferreous solution, its own bulk of alcohol, sp. gr. 0.840, is added, so as to form a proof spirit menstruum, decomposition immediately ensues, indicated by a cloudiness, and a precipitate of a treacly consistence and aspect, which collects at the bottom. The supernatant liquid is nearly colourless, and contains hardly any iron, but much tartaric acid. The viscid precipitate soon hardens into a brittle mass of subtartrate of iron, insoluble in water. Thus it appears, that a spirituous menstruum is not at all adapted for holding red tartrate of iron in solution, though Madeira and Teneriffe wines of common strength answer very well.

When the above concrete precipitate is treated with water, acidulated with tartaric acid, it readily dissolves, with the reproduction of red tartrate of iron.

The subtartrate, when newly thrown down, is fusible at the heat of 180° or 190° F. It burns reluctantly in the flame of a spirit-lamp, with a faint ignition, and a slight smell of caromel.

3. The potash-tartrate of iron, as prepared by the process of the London Pharmacopœia, is a powder of an olive-green colour, occasionally tinged with brown. When 100 grains of it were heated to the temperature of 160° F. they lost 4 grains; but this loss will vary according to the manner of preparing it.

By dull ignition, in a platinum crucible, it emits a lambent blue flame, and is converted into red oxide of iron and carbonate of potash, amounting together to 52 grains. The alkali was dissolved out with water, and tested with acid. It indicated 18 grains of potash, equivalent to 46.5 of tartrate of potash. The peroxide of iron weighed 32 grains. This existed in the original compound, partly as a tartrate, and partly as a subtartrate; for not more than two-thirds of the original powder are soluble in water.

If one volume of the solution of the potash-tartrate (in about seven times its weight of water) be mixed with one volume of alcohol, sp. gr. 0.840, so as to form a proof-spirit menstruum, the subtartrate of red oxide of iron immediately forms, and falls in a viscid mass, and the spirituous liquid becomes nearly colourless, containing very little iron.

Though the spirituous vehicle, prescribed in the Pharmacopœia, be weaker than proof, there can be no doubt from the above experiments, that a dilute alcohol is not nearly so proper a menstruum for this triple salt of iron as Madeira wine, which, containing a considerable portion of acid, will form a more powerful and permanent solution.

4. Medical men have, in modern times, probably paid too little attention to the state of oxidizement in which they administer iron. The older chemical physicians of the celebrated school of Stahl, taught, and I believe justly, that according as this metal is differently prepared, it acquires powers over the body of a different, and almost opposite, nature. Some preparations were said to promote the motion of the fluids through the whole system; while others repressed or obstructed these motions. The remarkable stimulant and deobstruent virtue displayed by iron in the cure of chlorosis, was, at that period, attributed to one of its supposed constituents, the *phlogiston;* as the astringent property was referred to the *earthy* ingredient. When these notions, derived from "old experience," are expressed in modern phraseology, we may say, that the mildly exciting power of iron will be found in its metallic or protoxide state; while its acrid and constringing qualities may be sought for in its peroxide, and in certain

saline compounds, where the acid contributes its share of the effect, as is the case with the sulphate.

In fact, it may be affirmed, that iron, like copper and mercury, acquires acrimony (pathologically speaking) by peroxidizement; a conclusion which would have been more generally drawn, had a good form of protoxide preparation existed in our Pharmacopœias, or our shops. The *precipitated subcarbonate of iron* is merely the peroxide associated with only from 3 to 5 per cent. of carbonic acid; and is, therefore, not entitled to its pharmaceutical name.

A very pure, mild, and permanent form of a protoxide-salt may, however, be easily obtained by exposing clean particles of iron, as bits of iron wire, to the action of tartaric acid and water at a gentle heat. An effervescence ensues, hydrogen is disengaged from the water, the iron is oxidized to a *minimum*, and is fixed in that state by its instantaneous combination with the acid of tartar. This tartrate owes its permanence to its insolubility; but yet (like iron filings and calomel) it acts energetically on the system. The prototartrate of iron is nearly white, and pulverulent. The powdery matter, as diffused in the liquid, may be decanted off the iron into a filter, and washed with a little water. It has a mild chalybeate taste, and will constitute a valuable accession to the *Materia Medica.*

At a dull red heat, this tartrate readily takes fire, and burns slowly away like tinder, after its removal from the source of heat, with the exhalation of a caromel odour; while the oxide of iron becomes peroxidized.—*Quarterly Journal of Science, Literature, and Art.*

Formulæ for different Compounds prepared with Sarsaparilla. By M. Beral, Pharmacien.

[Although we have devoted a large space already to Dr Hancock's valuable paper on Sarsaparilla; yet as this drug is unquestionably one of great importance, and much of the fluctuation of opinion respecting its absolute and relative value,

has probably arisen from the different modes employed in the preparation of it for exhibition, we feel it a duty to place before our readers every suggestion respecting these preparations that may come well recommended. It affords us pleasure, moreover, to transfer to our pages the papers of those liberal apothecaries, who, flinging aside the penny-wisdom of keeping secrets, step generously forward to aid the cause of science and humanity. We shall give the entire paper].

Of the numerous compounds, in which the principles extracted from sarsaparilla constitute the base, there are few whose mode of preparation is unexceptionable, and not many formulæ, unsusceptible of receiving some useful modifications. I have attempted some reforms, and submit to the Society of Pharmacy some new formulæ for these kinds of compounds, and the processes proper for their preparation.

Extract of Sarsaparilla with diluted Alcohol, or Hydralcoolic extract of Sarsaparilla.

℞.—Alcohol diluted, 20° Baumé 16 pounds.
Sarsaparilla bruised 2 pounds.

Macerate the root in the fluid for one month, then decant and filter through paper. Withdraw the alcohol from this tincture by distillation, and concentrate the liquid remaining in the water bath, in order to procure a soft extract, of which the quantity is generally about four ounces. A little before terminating the concentration of the extract, and while it is still sufficiently fluid, it ought to be filtered a second time.

This extract is preferable to those obtained by cold or hot water. Its properties are more active, not only because it is free from the gummy substance of the sarsaparilla, which the others contain in large quantities, but also because it contains none of the fecula of the root. M. Beral might also have added, because the alcohol is evaporated at a lower temperature than water, and the operation is performed in a retort.

Aqueous solution of the extract of Sarsaparilla.

℞.—Pure water 1 pound.
Extract as prepared above 1 drachm.

Dissolve the extract in the water and filter through paper. One pound or 16 ounces of this solution represents one ounce of sarsaparilla.

Alcoholic solution of the extract of Sarsaparilla.

R.—Alcohol diluted, 20° Baumè	14 ounces.
Extract of sarsaparilla, as above	2 ounces.
Total	16 ounces.

Dissolve and filter. One ounce of this solution represents one ounce of sarsaparilla.

Vinous solution of extract of Sarsaparilla.

R.—Spanish wine	15 ounces.
Extract of sarsaparilla	1 ounce.
	16

Dissolve and filter through paper.

Syrup of Sarsaparilla, more properly Syrup of the extract of Sarsaparilla.

R.—Extract prepared with diluted alcohol	1 pound.
Water	8 pounds.
White sugar	15 pounds.
	24 pounds.

Dissolve the extract in the water, by means of a gentle heat. Then add the sugar, and continue the same heat until it is completely dissolved. Suffer it to get cold, and strain it. The formula for this syrup is simple, its execution is easy, and a few minutes are sufficient to prepare it. There can be no doubt of the qualities of the product.

Syrup.	*Extract.*	*Sarsaparilla.*
24 ounces represent	1 ounce	8 ounces.
1 ounce represents	1 scruple	8 scruples.

Sudorific Syrup of Cuisinier, reformed.

℞.—Extract prepared with diluted Alcohol	1 pound.
Syrup prepared with sugar	8 pounds.
Syrup prepared with honey	7 pounds.
	16
Special aqueous tincture	8 pounds.

Mix the whole in a basin, and concentrate with a gentle heat to a syrup, in quantity about 16 pounds.

Syrup, 1 pound and 1 cuillerée*, represent,

Sarsaparilla	8 ounces	2 drachms.
Senna	2 drachms	4 grains.
Flowers of Borage	2 drachms	4 grains.
Pale rose petals	2 drachms	4 grains.
Anise-seeds	2 drachms	4 grains.

Aqueous Tincture for the preparation of the Sudorific Syrup of Cuisinier.

℞.—Anise-seeds	6 ounces.
Senna	6 ounces.
Flowers of Borage	6 ounces.
Petals of pale roses	6 ounces.
	24 ounces.
Boiling water	12 pounds.

Infuse the materials in the boiling water for 12 hours, afterwards subject them to a press, and finally filter.

Vinous extract of Sarsaparilla, commonly called portable tisane of Sarsaparilla.

℞.—Extract of sarsaparilla prepared with diluted alcohol	1 pound.
Madeira wine	3 pounds.
	4

Dissolve and filter.

Vinous extract, 1 ounce, represents 2 ounces of sarsaparilla.

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* Cuillerée is equal to ℥iij, 24 grs. French.

For the preparation of Tisane.

℞.—Common water		4 verres.*
Vinous extract of sarsaparilla		2 cuillerées.
Tisane 16 ounces represent of	sarsaparilla	2 ounces.
Tisane 1 verre represents of	sarsaparilla	½ ounce.

Sudorific Mixture of Dr Smith.

℞.—Sarsaparilla	8 drachms.
China root	2 drachms.
Liquorice	2 drachms.
Guaiacum	2 drachms.
Sassafras	2 drachms.
	16 drachms.

Cut, incise or rasp each substance, and mix them carefully.

Sudorific extract of Dr Smith.

℞.—Diluted Alcohol, 20° Baumè	16 pounds.
Sudorific mixture of Dr Smith	2 pounds.

Macerate the materials in the spirit for one month, then filter through paper Distil off the alcohol, and concentrate the liquid in a water-bath, to the consistence of a soft extract: the quantity will be about 4 ounces.

Sudorific Wine of Dr Smith, commonly called rob sudorifique, concentrated essence, or liquid extract of Sarsaparilla.

℞.—Extract sudorific of Dr Smith	1 pound.
Madeira wine	7 pounds.
	8
Volatile oil of sassafras	64 drops.

Agitate the oil with the wine, dissolve the extract and filter.

In the wine, 1 ounce includes { of extract, 1 drachm. / of oil, ½ drop.

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* Un verre is equal to ℥vj., ℥ij. French.

In the wine, 1 cuillerée includes { of extract, ½ drachm. / of oil, ¼ drop.

In the wine, 1 ounce represents 1 ounce of the sudorific mixture.

In the wine, 1 cuillerée represents 4 drachms of the sudorific mixture.

For many years a preparation has been employed in England, the virtues of which have been attributed to the sudorific mixture of Dr Smith, who was the author of it. When properly prepared according to the above formula, this compound possesses valuable properties.—*Journal de Pharmacie, Dec.* 1829.

New Salifiable Organic Base.

MM. Pelletier and Coriol announce that they have discovered a new alkaline substance, in a bark which frequently comes mixed with the cinchona. Some seroons arrived from the province of Aréquipa in Peru, containing this variety of bark. It was shipped from the port of *Arica* to a house in Bordeaux, for Calisaya bark; though some of the seroons were entirely filled with the spurious article. Notwithstanding this clue to its origin, they were unable to establish the botanical character of the tree which furnished it. The bark resembles the Calisaya in its colour, texture and physical properties generally. But in their taste they differ; the Calisaya is nearly a pure bitter, while the one in question joins to the bitterness a warmth and acrimony something like the true Angustura.

The *Arica* bark, as they call it, may be deprived of this alkaline principle by the same process as is adopted in the decomposition of cinchona.

This substance, in its physical properties, strongly resembles

the cinchonia, but in its chemical habitudes is essentially different. Like cinchonia, it is white, transparent, and crystallizes in rigid needles. When heated it melts at a degree below that which decomposes it, but it is not volatalized like cinchonia, according to M. Robiquet.

The principle of the Arica bark is absolutely insoluble in water, for which reason it at first appears tasteless, but by holding it in the mouth for some time, it imparts a bitter and acrid sensation: dissolved in an acid, its taste is developed, and is extremely bitter. Examined in combination with the mineral acids, the differences between the new alkali and cinchonia are most apparent. Sulphate of cinchonia crystallizes in rhomboidal prisms, but while the new alkali unites with, and saturates sulphuric acid, the salt is not crystallizable by means of water. Dissolved in boiling water, the solution assumes on cooling, the form of a white tremulous jelly, like a solution of ichthyocolla in milk of almonds. This jelly by drying becomes of a horny consistence, which may be restored to the gelatinous form by again using boiling water as its solvent.

This sulphate, dissolved in alcohol, crystallizes in silky needles, closely resembling those of the sulph. of quinia. The alkaloid crystals then are insoluble in water. The saline are soluble in this fluid boiling, and assume the gelatinous form on cooling. The alkaline crystals are soluble in ether, the saline are not.

Dissolved in concentrated nitric acid, this new alkali assumes an intensely green colour. When the acid is a little weaker, the colour though green is clearer, and a diluted acid occasions no change of colour. The capacity of this substance for saturation is much more feeble than either quinia or cinchonia, and the most of its combinations cannot be brought to the point of neutrality. It is composed of oxygen, carbon, hydrogen, and azote, but the azote is in much less proportion than in any of the other alkaloids. It is not poisonous. Its effects on the animal economy are about to be tested; but the authors are not prepared yet to give a detail of them, nor of the chemi-

cal properties of the bark, and its constituents. These will appear at length in a memoir from which the above facts are extracted.—*Journal de Pharmacie, November* 1829.

New Process for the Preparation of Morphia, &c. By M. J. B. Fauré, Pharmacien. (Extracted from a Thesis sustained at the School of Pharmacy.)

As every thing relating to morphia is so interesting at present, no apology is necessary for offering to our readers a new formula for its preparation. After having examined the several processes proposed by different chemists for the separation of this alkali, M. Fauré is disposed to give the preference to the following, which he says furnishes a larger product, and is less expensive.

Take of opium 1 part.
Cold water 4 parts.

He proceeds: I divided the opium into very small pieces, and subjected it to three successive macerations, at a temperature of 12 to 15° of Centigrade. For the first, I employed half the water indicated; for the second, one third; and finally, the remainder of the water for the last maceration. The solution was facilitated by malaxating and frequently stirring the mixture.

The liquors, being reunited and filtered, were evaporated to the consistence of a soft extract, which was dissolved in a quantity of water equal to that first employed for the macerations. This gave a troubled solution which was suffered to deposit for some hours. The supernatant fluid was poured off clear, and the remainder filtered. The two liquors were again reunited, and again evaporated to the state of a soft extract, which was heated as in the first case. These operations were repeated five times before an extract was procured that would not form a troubled or opake solution with water. The preci-

pitation takes place more rapidly in proportion to the coldness of the water. To the last solution of the extract in water, were added two ounces of animal charcoal for every kilogramme of opium employed. This was suffered to remain for some hours, the mixture being frequently stirred to facilitate the decolourizing action of the carbon.

After the liquor was filtered and concentrated, and while in a boiling state, a slight excess of liquid ammonia was added, which precipitated all the morphia in the form of brilliant light-coloured spangles, (*hydrate of morphia*). This was separated by a filter and washed with cold water until it ceased to colour the fluid. Afterwards it was dissolved in boiling concentrated alcohol, to which animal charcoal was added. The solution being filtered, the morphia precipitated in crystals. A second solution in boiling concentrated alcohol will render it *perfectly* pure.

We shall pass over the speculations of the author respecting the influence which the elements of opium exercise over each other in the native compound, as we have not space for all the matter that is presented to us.

Of this hydrate of morphia, he says:

When pure it is in the form of little brilliant, white plates, which are less than those of uncombined morphia, and more readily soluble in acids and alcohol, because of their inferior cohesion.

It is composed of morphia, 100 parts; water, 5 parts. This is proved by a given quantity of pure sulphuric acid requiring for saturation 100 parts of *morphia*, and 105 parts of the *hydrate*. One hundred and five parts of the hydrate of morphia, submitted for several days to a heat of 30°, lost five parts by an exposure to a temperature a little greater than that of boiling water.

*On the Mutual Action of Sulphuric Acid and Alcohol, and on the Nature of the Process by which Ether is formed. By Henry Hennell, Esq. Communicated by William Thomas Brande, Esq. F.R.S.**

1. I was some time since engaged in an investigation of the nature of oil of wine and of the salts called sulphovinates: the results I obtained were considered of sufficient importance to be honoured with a place in the Philosophical Transactions†. The oil of wine and sulphovinic acid are substances produced during the mutual action of sulphuric acid and alcohol in the well known process adopted for the preparation of ether; and an important point with me, during the above investigations and since that time, has been to develope the particular changes which take place when ether is formed from sulphuric acid and alcohol. I perceive by the *Annales de Chimie* for November last, that MM. Dumas and Boullay have been engaged on the same subject, and have experimented on and considered, not only the formation of ether, but also the nature of sulphovinates, and, as they supposed, though incorrectly, of oil of wine‡. That our results with regard to sulphovinates and oil of wine differ, may be seen from the published accounts; and there is not less difference between their conclusions with regard to etherification, and the results I have obtained, which I have now to describe.

2. When alcohol and sulphuric acid in equal weights are put together without the application of any heat beyond that generated during the mixture, the most abundant and important product is sulphovinic acid, above one-half of the sulphuric acid being converted into that peculiar acid by union with

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* From the Philosophical Transactions for 1828. Part I.

† Phil. Trans. 1826. Part III.

‡ The substance which these gentlemen operated upon appears, from their own account of its preparation, to have been the hydrocarbon separable from oil of wine by the action of alkalies, and not that peculiar substance which has hitherto been called oil of wine.

hydro-carbon*. But when such a mixture containing so large a proportion of sulphovinic acid is distilled, the most important product is a new substance, namely ether, and the sulphovinic acid disappears. The questions which then arose were, whether the ether was formed altogether from the direct action of the remaining alcohol and sulphuric acid in the mixture, or whether the sulphovinic acid might not also assist, or whether it might not be an essential state of the elements intermediate between the mixture of the acid and alcohol and the development of the perfectly formed ether. MM. Dumas and Boullay, who have considered the same questions, or at least some of them,—decide, that the portions of materials which form ether, are altogether independent of those which produce sulphovinic acid : but the following facts prove in my opinion the contrary of this conclusion.

3. A portion of oil of vitriol was selected from some comparative experiments, and also some alcohol of specific gravity 0.820 : five hundred grains of the oil of vitriol, precipitated by acetate of lead, gave 1500 grains of sulphate of lead.

4. Five hundred grains of the oil of vitriol were mixed with five hundred grains of the alcohol, and, after forty-eight hours, diluted and precipitated by acetate of lead; only 616 grains of sulphate of lead were produced; so that very nearly three-fifths of the sulphuric acid had become sulphovinic acid by the effect of mixture, and little more than two-fifths remained to act as sulphuric acid upon the remaining alcohol, full two-thirds of the quantity employed.

5. Another mixture of acid and alcohol in the same proportions, and made at the same time as the above, was then distilled until 117 grains had passed over, consisting of water, alcohol, and a portion of ether. The residue in the retort had not undergone any charring effect; and, being diluted, was precipitated by the acetate of lead : the quantity of sulphate of lead obtained, amounted to 804 grains, indicating an increase

* The sulphuric acid loses half its saturating power by the union, and all the salts formed by the new acid are soluble.

in the quantity of sulphuric acid equivalent to 188 grains of sulphate of lead.

6. A similar mixture of alcohol and sulphuric acid, made at the time and in the same proportions as the two former, was then distilled until two hundred grains had been received, the greater part of which was ether; the uncharred residual matter in the retort being then diluted, was precipitated by acetate of lead as before; 986 grains of sulphate of lead were obtained. This contained nearly two-thirds of the sulphuric acid first added, and the increase by distillation had been much more than one-half of that which existed before the application of heat: so that during the distillation, and simultaneously with the formation of ether, a quantity of sulphovinic acid had been reconverted into sulphuric acid, and the latter appeared to increase in quantity in proportion to the increase of ether in the distilled products.

7. A similar mixture of alcohol and acid, made at the same time and in the same proportions as the three former, was then distilled until two hundred grains had passed over. Two hundred grains of water were added to the contents of the retort; 160 grains were distilled off; a second addition of two hundred grains of water was made, and the distillation continued: a further addition of five hundred grains of water was made, and the operation continued until as much product had been separated as equalled the water added;—the object was to separate all the ether and alcohol possible, for the purpose of ascertaining to what extent the conversion of sulphovinic acid into sulphuric could be carried. No smell of sulphurous acid was produced during the operation, nor did any charring of the contents of the retort occur; when precipitated by acetate of lead, 1480 grains of sulphate of lead were obtained. This is very little short of the 1500 given by the acid when unacted upon by alcohol, and shows that nearly the whole of the sulphovinic acid had been changed back into the state of sulphuric acid; and is completely at variance with the opinion, that when sulphuric acid and alcohol act upon each other, hypo-sulphuric acid is formed.

8. From these experiments it appeared probable that the

ether was the product of the decomposition of the sulphovinic acid: but a mixture of equal weights of alcohol and sulphuric acid contains, besides the sulphovinic acid, a considerable quantity of unaltered acid and alcohol; for in such a mixture three-fifths (4) of the sulphuric acid would be converted into sulphovinic acid by combination with the hydro-carbon of less than one-third of the alcohol employed. I next proceeded to ascertain, whether, when no alcohol was present, ether would be produced. A quantity of the sulphovinate of potash was therefore prepared. The composition of this salt has been given in the paper in the Philosophical Transactions before referred to, and one hundred parts contain 28.84 of potash. Five hundred grains were mixed with 150 grains of sulphuric acid, being nearly the equivalent of the potash in the salt, and then heat applied. The experiment therefore may be considered as the distillation of sulphovinic acid mixed with sulphate of potash, which it may be presumed remained inert during the process, and also with the water of the acid and of the salt. The proportion of water, it is found, has an important influence; but in the present experiment about a drachm of fluid distilled over, and left a blackened and acid salt in the retort, having the smell of sulphurous acid. A few grains of carbonate of potash being added to the distilled product, abstracted a little water: the clear decanted liquor was then mixed with a little dry muriate of lime, and by agitation separated into two portions; the upper one being decanted, amounted to nearly half a drachm, and was found to be pure ether. This result proves that ether may be formed from a sulphovinate or sulphovinic acid when no alcohol is present.

9. An experiment similar to the last in the nature and proportions of the substances used, was made, except that the sulphovinate was dissolved in its own weight of water previous to the addition of the sulphuric acid. The experiment is one therefore of the distillation of dilute sulphovinous acid, in place of that which is concentrated. The distilled product had no smell of ether, nor could any be discovered in it. About nine fluid drachms were obtained; to these, carbonate of potash was added, which separated the water, and left three drachms

of a supernatant liquid, appearing by taste, smell and flame, to be alcohol: this was decanted, and poured upon muriate of lime; no ether separated, but the whole formed one solution; being distilled from the muriate it was evidently alcohol; and being mixed with its weight of sulphuric acid, gave sulphuric ether or sulphovinic acid again.

In this experiment there was no charring of the contents of the retort; and by precipitation by acetate of lead, the whole of the sulphuric acid was obtained;—not only the portion added to decompose the salt, but the double portion evolved from the sulphovinic acid upon the separation and rearrangement of the hydrocarbon.

10. In the former paper it was shown that oil of wine when heated in water is resolved into hydrocarbon and sulphovinic acid: an experiment was therefore made upon it. Two hundred grains of oil of wine were placed in a retort, a little water added, and heat applied: about a drachm was received, which, being redistilled from carbonate of potash, the product appeared to be principally alcohol, but the presence of ether was very evident. This experiment proves the formation of ether from sulphovinic acid when no sulphuric acid was present as such at the commencement of the distillation.

With regard to the questions at the commencement of this paper, it appears to me from the facts detailed, that in the usual process for obtaining ether, the ether is not formed altogether from the direct action of the alcohol and sulphuric acid considered independently of the sulphovinic acid present; for the quantity of free sulphuric acid is small compared to the quantity of alcohol present, two-fifths only of the acid remaining, while of the alcohol more than two-thirds remain; and further, sulphovinic acid alone is readily converted into ether and sulphuric acid, (see 8.) and during the distillation of ether in the ordinary way the sulphovinic acid is always reconverted more or less completely into sulphuric acid (4. 5. 6.) it probably therefore assists much in the process. With regard to the third question, the opinion may be supported that the formation of sulphovinic acid is a necessary and intermediate step to the production of ether from alcohol and sulphuric

acid; and although I do not mean to assert this view, yet it deserves a few remarks.

In no manner which has yet been devised can ether be formed from alcohol and sulphuric acid without the presence of sulphovinic acid. Whenever ether has been formed, sulphovinic acid has been present; whenever the sulphuric acid is diluted so far as not to form sulphovinic acid with alcohol, it also refuses to form ether with alcohol. Sulphovinic acid will produce ether without the assistance of alcohol. And although the ether produced, when a mixture of equal weights of alcohol and sulphuric acid are distilled, appears to be in greater quantity than can arise from the decomposition of the sulphovinic acid existing in the mixture previous to the action of heat, it is not I think inconsistent to suppose, that at the same time that one portion of sulphovinic acid is resolved into sulphuric acid and ether, another may be formed from alcohol and sulphuric acid; and that sulphovinic acid is formed in a mixture of sulphuric acid and alcohol by heat, is proved by the following experiment. Five hundred grains of oil of vitriol were diluted by five hundred grains of water; when cold, to the dilute acid was added two thousand grains of alcohol, specific gravity 0.820. The following day this mixture was examined for sulphovinic acid, but none had been formed: it was placed in a retort, and a quantity distilled off nearly equal to the weight of the alcohol employed: this had a specific gravity of 0.842. Carbonate of potash separated a considerable portion of water, the original alcohol would not even moisten that salt; the residue in the retort was examined, and now sulphovinic acid was found; the evidence of which was, carbonate of lead being dissolved in considerable quantity; here sulphovinic acid had been formed by heat, where it did not previously exist. This result appears also opposed to the opinion that in the formation of ether the sulphuric acid acts simply by abstracting water from the alcohol; for the dilute acid here gave up a portion of its water during the distillation, and separated from the alcohol a portion of hydrocarbon.

It has already been shown (9) that the production of ether is materially influenced by the quantity of water present, and

that the same sulphovinic acid will yield either ether or alcohol, as it is in a concentrated or dilute state. The hydrocarbon which, as was shown in the former paper, has the extraordinary power in oil of wine of neutralizing the whole of the acid properties of sulphuric acid, and in sulphovinic acid of neutralizing the half of them, being in the latter body in so peculiar a condition that it will unite either with that proportion of water necessary to form ether, or with the larger proportion requisite to form alcohol, according to circumstances.

In the experiments (8. 9.), in the production by distillation of ether or alcohol from sulphovinic acid more or less diluted, it appeared that sulphovinic acid might easily have its proximate elements separated and restored to their original state of sulphuric acid and alcohol. The following experiment was made with a view to illustrate this point. Five hundred grains of acid and five hundred grains of alcohol were mixed as before, and left for several days: by previous experiment it is known that more than half the sulphuric acid in this way becomes sulphovinic acid (4). By distillation and dilution at proper periods this would have given ether and alcohol, and nearly the whole of the sulphuric acid (7.): but instead of doing this, it was mixed with one thousand grains of water, and then distilled until 1400 grains had passed over. No charring or decomposition of the sulphuric acid took place; no ether was formed; but nearly the whole of the original alcohol and sulphuric acid were recovered. It may be a question whether the production of alcohol and ether in those and similar experiments is altogether determined by the proportion of water present, or whether the difference of temperature consequent upon its variation may not have an effect.

When ether and sulphuric acid are heated together, oil of wine and sulphovinic acid are amongst the products obtained; and as this sulphovinic acid is readily converted when diluted into alcohol and sulphuric acid, so it affords a method of converting ether into alcohol: thus ether may be formed from alcohol, and alcohol from ether at pleasure, by throwing the hydrocarbon of these bodies into that peculiar state which it assumes when combined with sulphuric acid in sulphovinic

acid. We may even proceed beyond this, and form either alcohol or ether, using olefiant gas as the hydro-carbon base: for I have shown in my last paper, that olefiant gas, by combining with sulphuric acid, forms sulphovinic acid, and the acid so produced forms either ether or alcohol, according to circumstances which are under perfect command.

It can hardly be necessary to refer to the extraordinary remark at the end of MM. Dumas and Boullay's second paper, except to state that it is singularly at variance with the facts and opinions given throughout the former part of that and the preceding paper by the same authors. Those persons who read both papers, and also those of Mr Faraday and myself, which were published long before the appearance of the former, will be able to decide without further comment from whom the particular views contained in those papers first emanated.—*Annals of Philosophy.*

Apothecaries' Hall.

Miscellany.

Citric Acid from Gooseberries.—M. Tilloy has obtained citric acid from this fruit at less than half the price it usually costs in France. Bruise and ferment the gooseberries, distil off the alcohol, and press the residue. Heat the liquor obtained by pressure, and add carbonate of lime until effervescence ceases. Collect the citrate of lime; wash, drain and press. The mass is coloured and contains malate of lime in mixture. Add water until it is of the consistence of thin syrup; heat, decompose by sulphuric acid, and dilute the whole with twice its weight of water. Separate the precipitate by a filter, and to the liquor add carbonate of lime. Collect this precipitate on a filter; wash, drain and press, and again precipitate with sulphuric acid. The clear liquor now obtained is to be boiled with animal charcoal, filtered and evaporated. When sufficiently concentrated, allow the liquid to deposit, and then put it into stoves heated between 68 and 72° F. Crude crystals of citric acid will thus be obtained, which are to be washed and recrystallized.—*Journal de Pharmacie, from Quarterly Journal of Science, Literature and Art.*

Pinic Acid a constituent of Venice Turpentine.—M. Unverdorben states, in a memoir published in the *Annalen der Physik und Chemie* for 1827, that Venice turpentine repeatedly distilled with water, leaves in the retort a semi-viscid mixture of resin with oils. The alcoholic solution of this gives a green precipitate with the alcoholic solution of acetate of copper. This is pinate of copper, and, when dissolved in

alcohol sharpened with muriatic acid, may be decomposed by water, the *pinic acid* precipitating in the form of a white resinous substance. Washed with boiling water and alcohol, and the latter removed, it remains solid, inodorous and almost insipid.

Pinic acid dissolved in alcohol, is gradually altered by exposure to the air; it is affected by heat also and forms only neutral combinations. It unites with the alkalies, potash and soda, through the medium of an ethereal solution. An excess of either of these alkalies precipitates the neutral concentrated solution; the same effect is produced by the neutral salts. This acid also forms salts with magnesia, baryta, alumina, manganese, lead, zinc, copper, and other metals. Some of these are little soluble, others completely so in ether; none are very soluble in absolute alcohol. M. Unverdorben ranks pinic acid immediately after the benzoic.—*Quarterly Journal of Science, Literature and Art, Dec.* 1828.

The Silvic Acid is another substance described in the same memoir, and is found in the resin of the *pinus sylvestris*, and fir tree. This is procured by acting on the resin with alcohol, several times, which dissolves every thing but the *silvic acid.* The latter crystallizes almost entirely on cooling, is colourless, and requires a higher temperature than 212° for fusion. Cold absolute alcohol and ether do not dissolve more than one-third of their weight; when boiling they take up more. This feeble solubility distinguishes it from most resins. This acid crystallizes in quadrangular prisms. Volatile oils dissolve it in all proportions.

The silvates have nearly the same properties as the *pinates;* the former, however, in some instances form *acid* salts. The silvate of copper is soluble in absolute alcohol, which distinguishes it from the pinate of that metal.—*Quarterly Journal of Science, Literature and Art, Dec.* 1828.

Chemical Constitution of Acetic Ether.—M. Planiava concludes from experiment, that acetic ether is formed of one equivalent of acetic acid and two equivalents of alcohol; that

therefore it is a subacetate of alcohol, and is represented by the number 97.—*Kas. Archives.*

Nut-galls an Antidote to Strychnia.—M. Guibourt cured a dog which was poisoned by the police, with strychnia or nux vomica, by causing him to swallow powered nut-galls: the convulsions immediately ceased. Milk and manna given the next day completed the cure. The same vegetable astringent, says M. Caventou, will arrest vomiting and destroy the power of emetic tartar; and M. Orfila advises their exhibition as an effectual antidote to the poisonous properties of opium or the salts of morphia.—*Bull. Universelle. Quart. Jour. of Lit. Sci. and Arts.*

Chlorine, Iodine and Bromine, Antidotes to the Vegetable Alkalies.—M. Doune communicated to the Royal Academy of Sciences, that the tinctures of iodine and bromine, and alcohol impregnated with chlorine, when added to the *uncombined* vegetable alkalies, destroyed their poisonous properties. Thus the iodides, bromides, and chlorides of strychnia and brucia, given to dogs in doses of two and a half grains, produced no deleterious effects: while half a grain of strychnia will produce tetanus and death. These antidotes, when given to arrest the effects of the poison, must follow its exhibition very quickly, since the lapse of ten minutes is sufficient to allow the poison to make an impression, which cannot be controlled by the antidote. Bromine appears to be the least efficacious of the three. But these compounds are all decomposable by acids; therefore they are inapplicable to the salts of morphia, and other alkalies. It is suggested that possibly some of the vegetable acids may possess a feebler affinity for these salts, and perhaps it may be found that the natural meconate of morphia, present in opium, may be decomposed by iodine, or bromine. If so, an antidote to this poison, may be discovered, which is of all others the most frequently employed for destroying life.—*N. A. Med. and Surg. Journ. from Révue Médicale for Sept.*

Test of Myrrh.—M. Bonastre states that the tincture of genuine myrrh is rendered of a dark red colour by the addition of nitric acid, while the spurious kinds, and all gum resins at present known, yield a yellowish colour under similar circumstances.—*N. A. Med. and Surg. Journ. from Nouvelle Bibliotheque, Aout* 1829.

Copaiba.—At a meeting of the Academy of Medicine of Paris, M. Guibourt remarked, that copaiba is readily soluble in alcohol, and affording a hard resin by boiling in water, was easily solidified with magnesia. But that if it remained soft after being boiled, and did not entirely dissolve in alcohol, it was a proof that it contained some fat oil, which prevented the solidification. He also said that ammonia, recommended as a test for the purity of copaiba, by M. Planche, does not always afford certain indications. M. Batka, a distinguished pharmaceutist of Prague, who was present, stated that copaiba, contaminated with any fixed oil, was speedily saponified by an alcoholic solution of pure potassa, but that when pure balsam was used, no such effect followed.—*Archives Generales, October* 1829.

On the same occasion M. Chevallier observed, that if pure copaiba be spread on unsized paper, and exposed to a gentle heat, it leaves by drying a stratum of resin, without straining the paper. If, on the contrary, any fixed oil be present, it does not dry, and leaves a resinous appearance, but an oily areola is formed around the drop of *copaiba.*—*Journal de Chémie Médicale, November* 1829.

Active Medicinal principle in the Root of Chiococca Racemosa.—The discovery of this substance was announced to the Royal Academy of Sciences of Paris, by MM. de Francois and Caventou. The shrub which furnishes this root is commonly called *cainca*, and grows in the forests of Brazil, on the bank of the river of diamonds, where it is termed *raiz preta* or black root. It is diuretic and purgative. The principle alluded to is a substance sui generis. It is white, crys-

tallizable, and the crystals arrange themselves in groups of small silky needles, like those of the muriate of morphia. Though destitute of odour it possesses a strong aromatic bitter taste. It dissolves in alcohol and ether, and partially in water. It burns like other vegetable bodies, but leaves no residue.

It is not alkaline, nor yet perfectly neutral, but as it is readily dissolved by alkaline solutions, it approaches nearer to the characters of an acid.

This substance is derived from the bark of the root, is taken up by boiling water, reddens the paper of turnsole, and is precipitated from the decoction in a pulverulent form, by the addition of acids. It appears to owe its suspension in water, according to M. Caventou, to the presence of lime ; but, as the precipitate cools, it assumes the crystalline form.

In the hands of Dr Francois it has proved a powerful diuretic. It does not purge, though the root in powder and the extract are said to display cathartic properties. The form of exhibition has been that of pills, and no unpleasant consequences have been observed to follow its employment. A diuretic that would seldom disappoint our expectations is a desideratum in medicine. And as this substance has received no small praise, we hope it will not be long before some of our enterprising apothecaries will order some of it from Paris. —*N. A. Med. and Surg. Jour. from Révue Médicale, et Journal Generale de Médicine for September.*

Alkaline principles in the Willow Bark.—M. Leroux, an apothecary at Vitri-le-Francais, was announced by M. Magendie on the 22d of June, at the Academy of Sciences of Paris, as the discoverer of two vegetable alkalies in the bark of the willow, bearing a strong similitude in all their properties to quinia and cinchonia. To MM. Gay-Lussac and Thenard was committed the charge of examining these alkalies.—*N. A. Med. and Surg. Jour. from Jour. Gen. de Méd. for July.*

Ergot of Maize.—In the Revue Medicale for August, is contained a memoir, communicated to the Royal Academy of Sciences of Paris in July, by Dr Roullin, on the subject of the

ergot of maize or Indian corn. This was frequently observed by the doctor during his residence in South America, and he says in some respects it resembles the ergot of rye, but in others is sensibly different. The form of this excrescence is that of a little tubercle from one to two lines in thickness, and from three to four in length. It is not as in the rye an elongated grain, but consists of a small cone engrafted upon a sphere, and resembles a pear in shape. It has no peculiar smell, and is of a livid colour. When eaten by man, it occasions the hair to fall off, and a looseness, and even entire loss of the teeth when the quantity taken is large. Similar effects are produced on animals: swine, which at first refuse, finally become very fond of it, and then experience the same deprivation of hair, and ultimately an emaciation and loss of power in the hind legs. Their flesh when eaten, after the progress of the disease to this extent, produces no unpleasant consequences. Mules eat the grain freely with similar effects, but are cured by removal to distant pastures. Hens, which live upon it, lay their eggs, without any calcareous envelope: the organs for expelling these bodies being stimulated to *abortion* before a shell can be formed. Monkeys, parrots, wild dogs and deer, who attack the fields, are often seen to fall as if drunk, without the power to rise again.

In the human subject, neither gangrene, nor convulsive disorders follow its use. This disease of the maize does not extend over any very great extent of country. It is unknown in Peru, Mexico, and the central republics. Dr Roullin never heard of it beyond Neyba and Mariquita in Colombia, and only in the warm parts of these provinces. It is stated by the natives to lose all its deleterious properties by being carried beyond the *Paramos*, high mountains where it is always cold. —*N. A. Med. and Surg. Jour. for January.*

Method of preparing Narcotic Extracts.—The following method of preparing these extracts, invented by Mr Battley, London, has been found to answer every purpose in preserving the green colour and medicinal properties of the plants. Plants, which from circumstances cannot be operated on imme-

diately, must be revived by immersing their stalks in water for twelve or eighteen hours. Those that recover by this means, and become of as lively and fresh a green as when growing, are to be bruised, pressed, and the juice passed through a fine hair sieve, and immediately placed on the fire. A quantity of green coloured matter begins to rise and float on the surface of the liquid, some time before it is brought to the boiling point; this matter is very abundant in the juices of some plants, but in all cases it is to be carefully removed by means of a perforated tin dish. By the time the liquor cools, or soon afterwards, the green matter ceases to appear. Rather more than half the fluid is to be evaporated by boiling, and then the remainder put into a conical pan, and suffered to remain there until it becomes cold. A large precipitate of dark green coloured feculent matter subsides from the supernatant liquor, which is to be poured off, and again evaporated to one-half, when it is also to be allowed to precipitate. This second precipitation is not near so green in its colour. The fluid from this is also to be boiled until it acquire the consistence of syrup. To this is to be added the matter obtained by the first precipitation and filtration, and the whole placed in a metallic pan, seated in a water bath, and further evaporated till it assumes the consistence of an extract.

The latter part of the process requires the constant attention of the operator until it is completed. It is not necessary that the matter be constantly stirred, but it should never be suffered to stick or become hard on the sides of the pan; for if it be allowed to harden, the extract loses its green colour, and in proportion to such loss is the deterioration of its medicinal virtues.—*London Medical Repository, Vol. IV.*

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ERRATA IN VOL. I.

Page 27, *for* De Candowle, *read* De Candolle.
166, *for* lesser, *read* less.
170, *for* Dicandria, *read* Decandria.
173, *for* fall, *read* pass.
192, *for* Cajupati, *read* Cajuputi, Plate, No. 3.
265, *for* pracox, *read* præcox.
266, *for* Wheelan, *read* Wheeling.
266, *for* quinque panax folium, *read* panax quinquefolium.
269, *for* Pimente, *read* Pimentæ.
289, *for* Octoedral, *read* Octahedral.
294, *for* Octoedral, *read* Octahedral.
294, *for* Tetraedral, *read* Tetrahedral.

In the explanation of the abbreviations in the Pharmacopee Universelle, published in our last number, page 312, our readers will please to observe that the letters employed to designate the titles of *Dispensatories and Pharmacopœias ought not to have been italicised.* Those prefixed to the names of *authors* of formularies, dispensatories, &c. *are, as they should be, italics.* We are sorry for the mistake, as we have already, and may again introduce formulæ from this Pharmacopee Universelle, with the letters of reference attached, and unless the above explanation be borne in mind, no one will be able to discover whether the reference in the formulæ is to official works or to the name of some author.